Telephony

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TELEPHONE TRANSMITTERS OF TO-DAY.

A General Discussion of the Elements Entering into the Construction of a Modern Telephone Transmitter.

By H. P. Clausen

THE telephone transmitter, while the most used, is at the same time, the least understood piece of telephone apparatus. In the earliest days of telephone practice the instrument which is now termed the telephone receiver served also as the transmitter, and had it not been for the invention of the variable contact transmitters it unquestionably would have been impossible to make the great strides in long-distance telephony such as we really have experienced since those pioneer days when the art was still in its infancy.

In order that a discussion of this kind may be of the most benefit to the general reader, it is important that the functions of the different elements entering into the construction of the telephone transmitter be touched upon briefly. And in order to accomplish this result it is thought that the outside mountings and operative elements of a certain transmitter be taken as an example for the purpose of analyzing the instrument. Then we may discuss the chief differences between the vital parts of the best known "tranmitters of to-day."

In its complete form, as shown by Figure 1, the telephone transmitter consists of a front, *A*, its mouthpiece, *B*, and the containing cup, *C*. Of course the operative elements of the instrument are contained within the cup, *C*, and fastened to the bridge, *A*, while the containing cup, *C*, is fastened to the supporting arm, *D*, in such a manner that it can readily be removed from the arm and another instrument installed in its stead.

Before entering into a discussion of the transmitter movement proper, let us examine into the details of its external features. The supporting arm, *D*, is generally mounted on the backboard or cabinet of the wall type telephone housing in such a manner that the height of the mouthpiece, *B*, can be adjusted within certain limits. As a rule, the supporting arm is so adjusted that when in its most downward position the diaphragm of the transmitter assumes a vertical position which position is that height which is most convenient to the person who frequently uses the instrument. That is to say, the distance from the transmitter to the floor is varied to suit the individual requirements of the constant user. In order to provide for the convenience of the chance user who is taller than the person for whom the instrument was originally adjusted, the transmitter arm is made so that it will permit of the entire instrument being

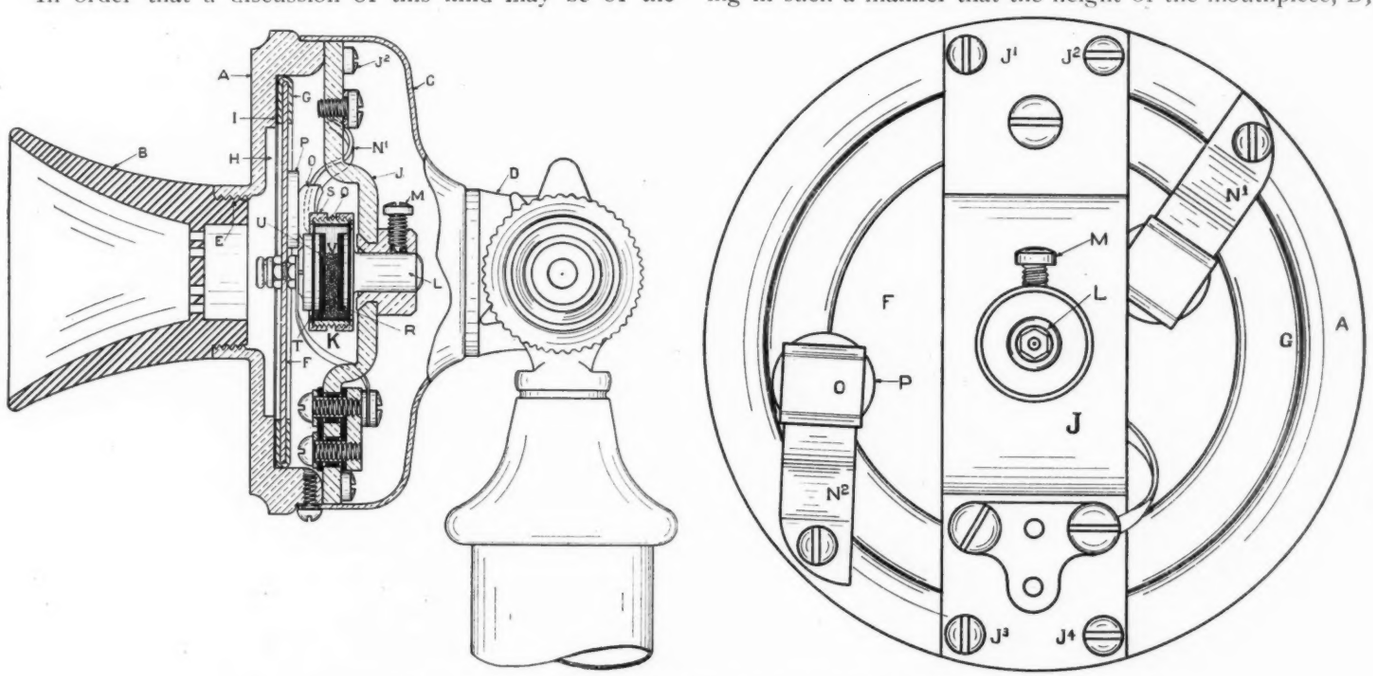

Figure 1—Sectional and inside back view of a typical telephone transmitter.

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drawn upwards. This producing a tilting effect, i. e., the transmitter diaphragm no longer is placed in a vertical position but assumes what we may term a "leaning back" position.

Figure 2 shows the effect produced when the diaphragm assumes a position somewhere between the vertical and horizontal state. Whenever a transmitter is tilted backward in the manner indicated, it is safe to assume that when in its tilted position, while the instrument may be somewhat more sensitive, it is, at the same time, less powerful. That is, with a given transmitter placed in a tilted position it would be possible to secure a more powerful transmission by readjusting the position of the instrument so that the diaphragm will be placed vertical.

Appreciating this advantage of a vertically mounted diaphragm, numerous contrivances have been invented which permit of a transmitter being continuously held in a vertical position. However, it is not within the scope of this article to touch on such arrangements.

The front, *A*, has a number of elements mounted upon it and is placed into the containing cup, *C*, and the best practice appears to demand that the front shall be screwed fast to the containing cup by means of three or four screws passing through holes in the outer edge of the cup.

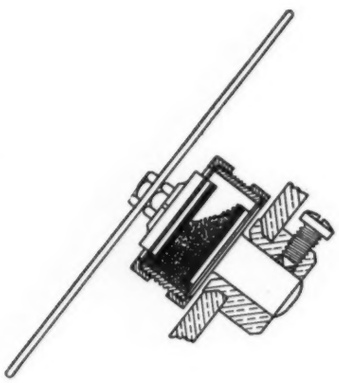


Figure 2—Showing effect of tilting transmitter backward.

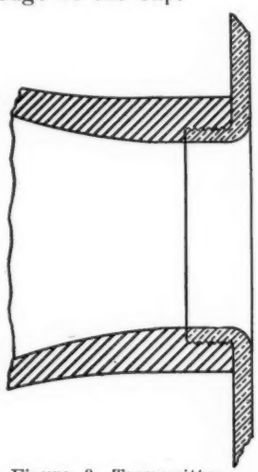


Figure 3—Transmitter mouthpiece with inside thread.

In this connection it is important to observe that a telephone user is apt to adjust the position of the transmitter by taking hold of the mouthpiece and drawing the instrument up or down, as desired. This means that any strain placed on the transmitter front through grasping the mouthpiece should not be permitted to act upon any portion of the microphone movement, as it might seriously affect the adjustment of the instrument. This is particularly true where the user places a pressure in one direction or the other on the mouthpiece while speaking. This feature of affecting the adjustment of an instrument may easily be observed by anyone taking the trouble to make the test upon almost any instrument in the market. Simply exert a pressure in any desired direction on the mouthpiece while gently blowing into the instrument. It will immediately be observed that a pressure in some certain direction completely deadens the sound which one hears in the receiver, and it is this deadening of sound which reveals the fact that some change of adjustment is being produced in the microphone movement. These little strains may not necessarily produce any great damage, but the effect is of sufficient importance to require attention in the design of an instrument, not only in the weight and distribution of the material forming the body of the front, *A*, but also, as intimated above, in the method which has been adopted for fastening the transmitter front, *A*, and its elements into the back cup, *C*. The most approved method employed is to fasten the cup to the front with screws in such a manner so that there may not be any undue strain produced on the front owing to an improper location and distribution of the fastening screws.

The mouthpiece, *B*, as a rule, is provided with either an inside or outside threaded portion at *E*. The inside threaded portion being shown by Figure 3 and illustrates the advantage claimed for this form of construction, viz., a larger space for the sound waves to pass through.

It is doubtful, however, whether this advantage is a real one, and judging by the general practice it would appear as though the outside threaded mouthpiece as shown by Figure 1 has been adopted as the most efficient one.

There is another feature in connection with the construction of the mouthpiece which has not yet been mentioned. Upon examination it will be found that most manufacturers supply a mouthpiece having a perforated screen near the threaded portion. This is provided for the purpose of preventing the diaphragm of the transmitter being struck by lead pencils or any other instrument in the hands of malicious users.

Passing now to the internal construction, we have, first, the shape of front, *A*. It will be observed that the diaphragm, *F*, has been surrounded by a soft rubber ring. *G*, and is placed into a pocket formed into the front, *A*. This leaving the space, *H*, which in some transmitters must be of a certain dimension in order to produce the best possible effects of articulation. *I* represents a thin disk of either celluloid or mica, and it is placed into the cup of the transmitter before the diaphragm with its rubber ring, G, is installed. *J* represents the bridge of the transmitter, and it is the element which holds the microphone movement, *K*, in its correct relation to the diaphragm, *F*, through the stem, *L*, being clamped into a certain position and held fast by means of screw, *M*. *N* shows a tension spring fastened to the cup, *A*, or bridge, *J*, and is provided with a short piece of soft rubber tubing, *O*, and when placed in its position the tension of the spring bears against the diaphragm of the transmitter and produces a certain state of stress in the diaphragm which materially aids in the suppression of undesirable effects of vibration of the diaphragm while speaking into the transmitter. Between the soft, rubber tubing, *O*, and the diaphragm, *F*, a piece of felt, *P*, is placed, and it serves the purpose of a cushion between the diaphragm and rubber tipped spring, *N*.

In passing it may be remarked that the disk, *I*, which has been placed between the metal front of the transmitter, and the soft rubber ring, *G*, surrounding the diaphragm, serves the purpose of preventing any tendency of the rubber fastening itself to the metal, and thereby preventing a free play of the diaphragm in its travels while being set into vibration by sound waves, and the cushion, *P*, it may be stated, incidentally also serve the purpose of preventing the rubber from adhering to the metal body of the diaphragm.

Having discussed the general features of construction entering into most types of transmitters let us examine into the operation of the instrument.and for the purpose of illustrating the general principle Figure 1 may be taken as an example. In the manufacturing of a telephone transmitter after the microphone movement. *K*, has been assembled it is found that we have a metal casing, *Q*, to which the front electrode, *R*, is fastened by means of a clamping screw, *S*, for, as it will be observed, the electrode and holder. *R*, are mounted on a flexible diaphragm, *T*. Therefore, when the electrode diaphragm with its mounting clamps fast to the casing, *Q*, it is held rigidly at its periphery, but at the same time the electrode may be given a certain amount of play. piston-like in action.

The electrode. *U*, which is mounted on the rear end of the microscope movement, may be mounted similarly to the front electrode, *R*, or in any other manner such as may be adopted by the manufacturer. In the present instance we

will assume that the rear electrode is fixed in a manner somewhat similar to the front electrode. Therefore we may assume that there is a piston-like motion applicable when we grant that the metal casing, *Q*, is being given a back and forward thrust. The metal stem, *L*, of course, connects to the electrode, *U* and as has been explained, may be locked in any desired position by screw, *M*. In the assembling of an instrument after the microphone movement has been completely assembled, and the granular carbon, *V*, has been placed between the electrodes, we are ready to attach the movement to the diaphragm of the transmitter and place the instrument in operation.

The first assembling operation consists in locking the front electrode to the diaphragm of the transmitter, thus holding the electrode fast to the diaphragm by means of nuts and lock nuts. The diaphragm with the microphone movement attached is then placed into the front, *A*, and the springs, *N1* and *N2*, are placed into position as has already been explained. Next, the bridge, *J*, is placed into position and the screws, *J1*, *2*, *3* and *4*, securely tightened so that there may not be any possible shifting in the position of the bridge.

The next operation is to observe whether the post, *L*, plays perfectly free through the opening provided for it in the bridge, *J*. The next act is to adjust the instrument which, as a rule, consists in pressing the post, *L*, towards the diaphragm of the transmitter. Only a slight pressure is applied, but the degree of pressure is important and differs in the instruments manufactured by various companies. It is a matter of considerable importance that the adjustment of a transmitter is made correctly. As a rule, it is advisable to adjust the instrument by connecting an ammeter in the circuit and observing when a sufficient amount of pressure has been applied to the post, *L*, in order to place the resistance of the instrument at a required predetermined proper figure. Of course, when such adjustments are made, it is necessary that the resistance finally arrived at must be that resistance which is offered by the granular carbon between the electrode surface while the granular carbon is in a comparatively "shook up" condition. That is, the resistance of a "packed" transmitter is not to be considered the resistance of the instrument when properly adjusted.

Assuming, however, that the instrument has been adjusted correctly, then the effects of speaking into the mouthpiece of the transmitter will be to set the diaphragm into vibratory motion, and when the springs, *N1* and *N2*, have been correctly set it will be found that the travels of the diaphragm in response to the sound waves striking on it are remarkably similar to the exact rate of frequency of the sound waves. It is the object in the construction of a telephone transmitter to eliminate so far as possible all false vibrations due to the natural rate of vibration of the metal diaphragm or the different portions of the instrument entering into the construction of it. Even the weight and shape of the front, *A*, has considerable effect on the articulation and the space within the cup, *C*, may also affect the quality of the speech transmitted. The object aimed at, of course, is accomplished by varying the resistance between the electrodes, *R* and *U*, through the medium of the granular carbon, *V*, and that can obviously be best accomplished when no interfering vibrations are had through the electrodes being in contact with certain elements of the instrument which are liable to create the interfering effects.

Before discussing the different types of standard microphone movements a few words regarding the chief requirement of such movements may be of interest.

Experience has demonstrated that the proper finish for an electrode surface is a highly polished one. General experience further indicates that for certain classes of service the electrode should be of carbon, although this is not strictly true, some special service requirements being found in instruments where a potential of twenty-four volts or less is used in connection with the telephone circuit. The carbon surface appears to better withstand the higher voltage than any other surface developed up to the present date. For low voltage transmitters, however, experience seems to show that some forms of metallic electrodes do produce satisfactory results, and it is the writer's opinion that this is largely due to the fact that a more intimate electrical contact is made between the carbon (granular) and the electrode when a metal electrode is used. The term "intimate" should be understood to mean that carbon granules when lying in contact with a metal electrode make a better electrical contact than would be the case if a carbon electrode were used, for any carbon electrode which it appears possible to produce possesses a higher resistance than a metal electrode. The writer believes that the lower resistance obtainable in transmitters of the low-voltage type is of considerable benefit and that the only problem which presents itself is the application of a metallic surface which will not under any circumstances be burned or fused through the passage of a current. In other words, if we take a metal electrode transmitter and find that it gives excellent service for a considerable period of time when used in connection with a current not running over three or four volts potential and place such a transmitter in connection with a high voltage circuit, it may be found, and generally is found to result in a burning, fusing or melting effect where the carbon granules lie into contact with the metal surface of the electrode, and it is this fusing which produces an unequal surface on the electrode and in course of time results in producing what we recognize as the "packing" effect.

TRAIN-DISPATCHING BY TELEPHONE.

The telephone has taken the place of the telegraph for the dispatching of trains on the low grade line of the Pennsylvania railroad between Columbia and Morrisville, Pa. The headquarters of the new system is located at White Marsh.

So successful have been the trials of telephones to replace the telegraph operators conducted by officials of the Pennsylvania that it is believed the development of the new system will be rapid. The entire low grade division of the Pennsylvania, including the Susquehanna, Glenrock and Trenton cut-off divisions, is now operated by telephone.

It is believed among Pittsburg officials that the telephone system is to be extended rapidly and that it will not be long before it will be extensively used on the divisions of this section. The experiments have proven the availability of the telephone and its superiority in many cases over the telegraph. On the low grade division, instead of handling a train movement from Altoona, a general dispatchers' office has been opened at White Marsh, near Morrisville, and six employes were transferred to White Marsh from the Altoona office. The low grade system from Columbia is divided into three divisions, that from Columbia to Thorndale being known as the Susequehanna division; from Thorndale to Glenrock as the Glenrock division and from Glenrock to Morrisville is known as the Trenton cut-off.

Over these three systems there will be no telegraph used to dispatch trains. At every cross-over switch or siding there will be a telephone booth. Conductors before entering the block will telephone to the nearest tower on the block to learn whether the way is clear. In all there will be about forty-five booths between Columbia and Morrisville. The dispatching point, or what is to be known as the exchange at White Marsh, will be in connection by telephone with the Harrisburg office.

This new telephone system does not mean that the towers will be abandoned. The same number of operators will be retained and rules observed as in the past.

CANADIAN TELEPHONE CONVENTION

The Independents of the Dominion Will Meet at Toronto on September 4

By R. S. Gray

ELABORATE preparations are being made to make the second annual convention of the Canadian Independent Telephone Association, which will be held at Toronto Wednesday, September 4, a notable affair. An interesting programme is being arranged, and the reports received by the officers indicate that a large number of delegates will be in attendance. Leading Independent telephone men from the United States will attend the meeting, including Theodore Gary, of Macon, Mo., president of the International Association; John A. Harney, assistant secretary; J. B. Ware, secretary of the Michigan State Association, and others equally well known. Matters vitally affecting the Independent interests will be discussed—legislation, exclusive agreements, the formation of provincial and district associations, etc.

The following are the officers of the Canadian association: President, Alpheus Hoover, Green River, Ont.; vice president, F. D. Malkay, Toronto; secretary-treasurer, A. F. Wilson, Markham, Ont.; executive committee, J. F. Demers, M. D., Levis, Quebec; W. Doan, M. D., Harrietsville, Ont.; Francis Dagger, Winnipeg, Man.; C. J. Thornton, Kirby, Ont.; A. Ochs, Preston, Ont.; C. Skinner, Sherbrooke, Quebec; Richard Vigars, Port Arthur; E. Hart, Bransford; Levi Moyer, Beamsville, Ont.

The Telephone Age, the Independent journal of Canada, in a recent editorial had the following to say as to the work and plans of the association and its convention:

"No argument is needed to prove that there are many things connected with the Canadian Independent Telephone Association which need quite a deal of talking over—and of acting upon the conclusions arrived at. It could not be expected that an association such as this should spring into existence either perfect or even without serious flaws. But the time has arrived for removing some of them and working towards a much fuller degree of usefulness.

"The Telephone Age, in its first number, defined some of the requirements of the association as follows: The first thing needful for such an association is to have definite aims; the second, to work for them with all its might. Briefly stated, these purposes may be divided into two classes, destructive and constructive. An Independent telephone association must recognize that it has a most powerful antagonist to combat. Individually, its members realize this already, but the one main object of their joining together is to use the common power in repulsing the latter's attacks. The association must be ready to carry the fire into the enemy's country if necessary; must re-

Alpheus Hoover, President.

J. F. Demers, M. D.

A. E. Wilson, Secretary.

Reports received by the association show that many new organizations started last year, largely through the efforts of the association, and also that rapid progress was made by the older companies, both in increase in mileage, standardization of lines and equipment, as well as most surprising increases in the numbers of new subscribers and the popularity of non-Bell or Independent companies, which have now become recognized in most portions of Canada as firmly established, successful and permanent.

Considerable interest attaches to the election of officers of the association. A strong sentiment exists in favor of the selection of Dr. J. F. Demers, of Levis, as the new president of the organization. Dr. Demers is one of the most progressive and active men in the Independent telephone movement in Canada, and would successfully carry on the work of the association so well inaugurated by Alpheus Hoover. Dr. Demers is secretary and treasurer of the National Telephone Company, a strong and growing Independent concern, and is well qualified to head the Canadian organization.

fute his statistics when false; must act in unison to defend an individual's rights should they be attacked. So much for its program of destruction. The constructive part of the association's policy is even more important. Mainly, it should be educational. In an almost virgin field like Canada, the wide scope for the systematic spreading of information is almost without limit. Daily the cry for telephone facilities in our country districts becomes more insistent. An association can show up the folly of buying cheap or second-rate apparatus, which more than anything else will tend to discourage the movement. It can gather

E. S. Bernard, President.

C. J. Wright, Secretary-Treasurer.

C. Skinner, General Manager.

Officers People's Telephone Company, Sherbrooke, Canada.

and disseminate useful facts and figures bearing on the industry. It can help to keep its members and the public informed as to new improvements in telephone appliances. It can teach new concerns the foolishness of starting with rates which are too low to admit of adequate service and of keeping lines in proper repair. It can prevent fakirs from entering the business, disappointing patrons and discouraging legitimate investors.

"These remarks still hold good; but whereas last year it was sufficient to dwell upon the outward objects of such an association, the growth of the movement renders it imperative now that the organization and methods used by that association should be the best possible adapted to those objects. In other words, discussion must be centered in, and action taken on internal structure rather than on its avowed purposes.

"This is why it becomes the duty of every man identified with Independent telephones, either in the manufacturing or operating field, to be present at the convention to give his ideas and to help to bring to life the latent ideas of others. However much larger future conventions may be than this one next month, it is not likely that any will be of greater moment to Independent telephone men or fraught with issues more important to the future well-being of the cause. That is why we say to every telephone man in the country: 'Come; you may not know exactly how or where you can help, but help you surely will.'

"We do not propose to enter at length now into a discussion of the present and immediate needs of the association, but would merely suggest that there are two or three points which are bound to come up at the convention, and which will have to be settled. First and foremost, there is the choice of officers to carry on the executive work of the association. It is imperative, if the objects of the association are not to become a farce, that those selected to fill official positions should be not only able, energetic men, enthusiastic in the cause, but that they should be absolutely free from the faintest shadow of connection with any manufacturing or supply house, either present or prospective. Any man who is really good enough to kindle an idea in other members of his fitness for an important official position will be good enough also to know that this proposition is one which needs no argument; that is, that any suspicion of partiality in a business like this, where first reports of new telephone movements come naturally to association headquarters, will practically kill any effect for good that that association may have.

"Another thing connected with the association which will, or should, receive very careful consideration at the convention, is the placing of it on a proper financial basis. With a proper understanding on the first-named point, there should be no difficulty encountered in getting enough funds to hold the association together, and enable it to carry on efficient work. This whole question of fees and financial support should be thoroughly threshed out. Needless to say, a membership fee of one or two dollars a year is absurd, if any good is expected of its endeavors."

The Canadian convention will be held during the second week of the Toronto exposition, making it possible to obtain the lowest rates.

FEW TELEPHONES IN LIVERPOOL.

Telephones are not as generally used in Liverpool as in America, writes United States Consul J. L. Griffiths, the total number of telephones in that city and suburbs, with a population of 1,020,000, being only 24,415 on December 31, 1906. The English service is not as good as the American. The absence of competition, there being but one system in that district, and the disinclination to adopt the latest improvements impair the efficiency of the service, while the requirement that the rental shall be paid an entire year in advance decreases the number of subscribers. The long-distance service is not comparable to such service in America. By a contract executed some time ago the telephone system will be nationalized and pass into government ownership in 1912. It is said that when present contracts expire a measurement basis will be inaugurated similar to the American system and the rate established on a minimum number of calls.

THE KELLOGG COMPANY

Dismal Failure of Five Years' Strenuous Efforts to Deceive Independents

TELEPHONY would be pleased to receive letters from its readers giving their views on the Kellogg case. It is a Bell owned concern and not entitled to the support of Independent telephone men. Write your views fully and frankly and send your letter in to-day. This publication will fight the Kellogg Company so long as it is owned by the Bell Company. We believe this policy meets the views of all loyal Independents. Is this *your* opinion? TELEPHONY will continue to be an Independent telephone paper for Independent telephone men. Are *you* with us?

FOR something over five years past, the Kellogg Switchboard and Supply Company has been a Bell-owned concern. Although catering to Independent trade and sparing of neither efforts nor expense to secure orders, this company is just as essentially and materially Bell as if it were named "The Western Electric, No. 2." Characteristic of Bell policy, however, the Kellogg company continues to masquerade as a wolf in sheep's clothing, using every deceptive argument, specious promise and, alluring inducement to tempt the buyers in the Independent field. What headway the company has made under this kind of a programme continues to be in some quarters a matter of conjecture, but among many there is not the slightest doubt. After talking with employes of the Kellogg plant and after having conversed with leading telephone men from many states, as well as having enjoyed ample opportunity for personal observation, a telephone man made the following deduction:

"The Bell has failed signally in its efforts to use the Kellogg company as a cloak to secure Independent trade."

Very few Independent companies are buying Kellogg apparatus at all and their number is diminishing each month. As a matter of fact, no self-respecting man who values his standing as a loyal "Independent" will have business dealings with a Bell concern, of the Kellogg type.

To explain more particularly what is meant by this assertion, and to show just why every true Independent is exceedingly averse to any dealings with the Kellogg company, one needs only to read the following excerpts taken from the official reports of the International Independent Telephone Association and from Paul Latzke's book, "A Fight With an Octopus."

At the International convention held in Chicago, June 27, 1906, the following resolution was introduced by Mr. Theodore Gary of Macon, Missouri, who is now president of the association, and was unanimously adopted as the sentiment of that body:

WHEREAS, It is known that the Kellogg Switchboard & Supply Company of Chicago is owned by the Bell officials; therefore

"Be it Resolved, That this association recommend that its members and all Independent telephone companies and individuals refrain from purchasing apparatus from them; provided, that those now using the Kellogg equipment may continue to purchase additions and extensions without prejudice.

"And Be it Further Resolved, That in the event of the Kellogg Switchboard & Supply Company again passing into the control of Independent people, that this resolution will be void and of no effect."

During the progress of the debate upon this resolution such stirring comment as the following was evoked:

Mr. Smith, of New York, said: "I had the privilege of serving for a short time as an officer in the United States army and under the articles of war I learned that it was treason to aid and abet the enemy, and I ask you, if we or any of us can afford to be branded as traitors. I do not care what their prices are, every dollar that you give to them will be used to cut your own throats, and if the iniquitous scheme and plan of the Bell Telephone Company, through a certain person connected with the Kellogg company had been successful, every user of Kellogg switchboards and supplies today would be tied up under an injunction, and to think for one moment that men who have the honor of being members of so intelligent a body of men as this, should so far forget themselves. should so far forget their honor to themselves and to their brothers in this cause, as to purchase one dollar's worth of stuff from that concern is astounding; words fail to express my contempt. I ask you, if a man broke into your house last night and attempted to murder your family and put you out of existence, would you contribute today to a fund to secure counsel to defend him? That is what you are doing when you are purchasing from that concern. I have no interest, directly or indirectly, in any manufacturing or supply concern, I am only speaking as an official of an operating company, and you may say what you please about prices, I want to say this, for the company of which I have the honor of being the vice president, the Niagara Telephone Company of Niagara Falls, New York, that as long as the present conditions exist, as long as it is known, that this concern is in the control of the Bell Telephone Company, it could not give us its outfit and supplies."

Mr. Behymer, of Petersburg, Ill., said: "The people of this organization cannot serve two masters. Abraham Lincoln, one of the martyred presidents of the United States, said: 'A government cannot exist half slave and half free.' This organization cannot exist half slave and half free, and so I say, without puncturing the heart of any individual here, that if he is an Independent, let him be an Independent pure and simply. If he is a contributor to the Kellogg company, he is a contributor to the Bell company that owns the Kellogg company. If he is a contributor, I do not care how little, toward the Kellogg company, then he is putting ammunition into the hands of the Bell company for the destruction of you and the rest of us."

Taking up some of the evidence which Paul Latzke presents in his "Fight With an Octopus," we find the following in Chapter XX, under the caption, "The Climax of Underhanded Bell Methods:"

"Several years ago the Bell managers made up their minds to try a new way of cornering the business. They decided that they would buy the chief Independent manufacturing plants, not openly, but secretly, and trap the operating companies in a manner that, had it succeeded, might have resulted in serious damage. One of the leading concerns then engaged in making apparatus for the Independents was the Kellogg Switchboard and Supply Company. It was not more than five or six years old, but its success had been extraordinary. Conditions lent themselves admirably to the scheme so far as the Kellogg company was concerned, and it fell.

"The Kellogg company was controlled by Milo G. Kellogg, who had started the fight against the Bell company

in the Berliner patent case. Various causes had contributed to break down Mr. Kellogg's health, and he had been forced to relinquish all business. He turned the Kellogg company over to his brother-in-law, Wallace L. DeWolf, under a power of attorney, and went to California, where, it was generally supposed, he would die.

"In June, 1903, the industry was startled by the information that the Kellogg company was owned by the trust. The Kellogg stock had been sold to representatives of the American Bell Telephone Company, by Mr. DeWolf, while Mr. Kellogg lay helpless in California, and without his knowledge. The facts were dragged into the open through a suit instituted by some of the minority stockholders, who sought to set the sale aside. The pleadings laid bare a plot that, for sheer business immorality and mean rascality, has not often been equaled.

"For eighteen months, before the bringing of the suit, it developed, the Bell had been secretly in control of the company. It had bought the Kellogg stock from Mr. DeWolf under a pledge that the latter would keep the facts of the sale a secret and continue as the directing head of the concern. The object was simple. It was desired to load the Independent operating companies with Kellogg apparatus. Some of the most vital parts of this apparatus were at that time in suit, under claims of alleged patent infringement brought by the Bell company and the Western Electric Company, the manufacturing branch of the Bell. Unless these suits were properly defended, the Bell and the Western Electric companies would be in a position to shut down every company using the apparatus. With the Bell secretly in control of the Kellogg, there would be only a mock defense of these patent suits, judgment would enter for the plaintiff, the "infringing" apparatus would be seized. scores of Independent operating companies with millions invested in plants would be forced out of business, and the trust would come into its "own" once more.

"Only one thing interposed to prevent the consummation of this pretty plot. Mr. Kellogg did not die." * * * After months of deceit, lying, hypocrisy and misrepresentation, the Kellogg company was finally * * * "compelled to come out in the open. It has ever since been conducted as an out and out Bell corporation, with Mr. DeWolf as president."

Mr. Latzke also presents in his book a letter written to Mr. F. P. Fish, then president of the Bell company, and signed jointly by F. J. Dommerque and Kempster B. Miller, author of "American Telephone Practice," who were stockholders in the Kellogg company when the disclosure of its purchase by the Bell was made. This letter indicates so clearly from a cold-blooded business point of view just what may be expected of the Bell as regards the Kellogg company, and expresses so distinctly the latter's present standing as related to the Independent field, that it follows in full:

Last week we were informed by Mr. F. W. Dunbar that since January, 1902, the control of the Kellogg Switchboard and Supply Company has been in the hands of the Bell telephone interests, of which you are the head. We have since had opportunity of reading much of the correspondence that has passed between yourself and Mr. E. M. Barton, representing the Bell interests, and Mr. M. G. Kellogg and his advisor, Judge R. S. Taylor. We therefore feel fairly well posted on the situation.

We learn from this correspondence, three facts of special significance.—First: The sale was made during Mr. Kellogg's prolonged severe illness, without his knowledge or consent, and against his wishes and interest.

Second: A condition of the sale, imposed by your interests, was that the matter should be kept a secret, and that ostensibly the Kellogg company should be Independent, although its policy was to be directed entirely by you and your associates. Even Mr. Kellogg himself, who had owned far more than a controlling interest in the stock, did not know of the sale or its contemplation until six months after its consummation.

Third: Mr. Kellogg has exhausted every means to get back his stock, or a control of the company, even at a price that would have netted your interests a large profit on the transaction.

All of the above information came as an unqualified surprise to us last week, and revealed a condition of affairs we had never conceived as existing, or as being possible. We write you of the matter, not in a spirit of anger, but as fair-minded men, deeply interested, believing that you will be no less fair minded. If in this letter we "call a spade a spade," it is done advisedly and simply because we believe the conditions warrant such a use of English terms.

During the time elapsed since the passing of stock into Bell hands, we two have more than any others, come into contact with the public, particularly in negotiating for large contracts for the Kellogg company. In such negotiations we have been continually met with rumors and statements, assiduously circulated by our competitors, to the effect that the Kellogg company was in reality a Bell concern. Both of us have endeavored to learn the truth. Mr. De Wolf, our president, has given repeated assurance as to the entire falsity of such statements. Due to our convictions thus obtained, we have strenuously denied these statements, and on the strength of our personal assurances in many cases given to our personal friends, we have succeeded in closing many hundred thousand dollars worth of contracts for the Kellogg company, which would have gone to our competitors but for our personal assurances.

Three instances of this may suffice: Early in 1902, the undersigned, F. J. Dommerque, closed contracts with the Frontier Telephone Company of Buffalo, New York, for the entire telephone and switchboard equipment of their then proposed exchange. He only obtained this contract under the understanding that there was no truth in the statement that the Kellogg company had sold out. The business as a result of these contracts has amounted to about two hundred and fifty thousand dollars.

Only recently he was also enabled, by the same assurances, most positively given to the engineers, officers and certain directors of the Kinloch Telephone Company of St. Louis, Missouri, to close four contracts with that company for telephone equipments, aggregating in value approximately one hundred and fifty thousand dollars.

In May, 1902, the undersigned, Kempster B. Miller, negotiated with the Empire Construction Company, for furnishing the telephones and switchboards for the exchange they were about to build in Los Angeles, California. He was met with the same statements made by a competitor, which statements were given considerable credence. It was on the strength of his personal assurance, (to his personal friends) that the rumors were discredited and the contract closed. This contract has resulted in the purchase of nearly a quarter of a million dollars worth of apparatus and material from the Kellogg company. About eight months after the closing of this contract, one of the officers of the Empire Construction Company told Mr. Miller, that the principal thing that saved the contract from going to a competitor, was his personal ability to convince the gentlemen making the purchase, of the entire independence of the Kellogg company. It will be seen, therefore, that we have been duped by lies and deceit, into leading the people with whom we have been dealing, (frequently our personal friends) into making contracts which they would not have made, had they known the truth. That we have unwittingly done these people a great wrong, you can have no honest doubt. Aside from the injury to our customers, consider that to ourselves. Our greatest asset is our good name, and we are both widely known in this country and abroad. People have accepted our word for that which we had every reason to believe to be true, and have been led into making a serious mistake as a result.

These customers were given assurances not only as to being able to purchase in the future apparatus of like quality, delivered when required, at prices not greater than originally paid, and that they would be given the benefit on future purchases of any improvements made by the engineers of the Kellogg company, but that they would also always receive competent protection against patent litigation. They were thus made to feel that they would be enabled to keep abreast of the development of the art, and at all times be honestly protected. Even though your interests might give positive assurance to the Kellogg company's customers as to future treatment, the feeling will naturally be, that they have been "delivered into the hands of their enemies," i. e., into the hands of those whose interests are diametrically opposed to their own. Such a condition of affairs as now exists, will when known, cause a feeling of unrest and uneasiness among the customers and those financially interested whom we have unwillingly and unwittingly duped, and this will necessarily result in a serious depreciation of their securities and holdings.

You will, therefore, see that the injury done to our customers, our friends and ourselves, is real. The instrument in accomplishing this injury was Mr. De Wolf, but it appears to us from what we learned, that the responsibilities rest with you and your associates, who inaugurated and dictated the policy of *seerecy* with its consequent lies and deceit.

We cannot believe that you, for whom we have always the highest respect, or your associates, can have been fully alive to the real wrong that such a course as has been followed, will en-

tail. We cannot believe that the Bell interests would wish, or can afford, to live under the odium of such a long continuing piece of treachery as this, even though the results to be gained were of great value otherwise.

If we, as young men, be allowed to make suggestions to you, who have had far greater business experience than we have, we ask you to seriously consider whether there can be any real advantage to the interests which you and Mr. Barton represent, to have it appear that your company and its business interests are conducted, even in this one case, along the lines which this affair has now assumed. There is but one remedy, and you owe it to the customers of the Kellogg company, as well as to every employee of this company, who has innocently been made to sail under false colors during the past eighteen months, to adopt that remedy and to restore the control of the Kellogg company by the return or resale of the stock which you purchased or caused to be purchased, to those parties who held such control prior to January, 1902.

In this world, people are sometimes called upon to sacrifice something, in order to stand true to principle; and the amount of sacrifice which they are willing to make, indicates somewhat the extent to which they are actuated by principle.

We hope that we may hear from you at once on this subject, as the situation has become intolerable, now that we understand what it is.

"Mr. Fish's answer was curt and to the point. He declined to consider the ethical question involved. He denied their right to interfere in the matter and desired them to consider the incident closed.

"It was then decided that it was hopeless to think of influencing the Bell people on moral grounds, and another course of action was undertaken. The facts up to this time had been kept secret in the hope that something might be done to disentangle the affair with honor to those concerned. Now secrecy was abandoned and Messrs. Dunbar, Miller, Dommerque, Dean, and a number of other minority stockholders joined in a suit to have the sale of Mr. Kellogg's stock set aside. This suit was brought in the circuit court of Illinois, on June 5, 1903, and is still pending. The filing of this suit was the first positive information the public had of this nefarious transaction. The Kellogg company was, of course, compelled to come out in the open. It has ever since been conducted as an out and out Bell corporation, with Mr. DeWolf as president."

Notwithstanding all of these facts the Kellogg company continues with amazing effrontery to disclaim Bell policies and to solicit Independent support. Its waning trade, however, tends to show that the Independents are by this time pretty well posted in regard to the enemy's tactics and that new developments along entirely different lines may be expected from that quarter soon.

TELEPHONE GOOD FORM.

The telephone public has placed the stamp of approval upon the greeting "Hello". Once eschewed by the dignified and correct, patronized only by the tough and the schoolboy, "Hello" has at length broken the barriers of prejudice and become a member of good society for telephone use, says a sensible writer in the Delineator. But it has not crowded out the more formal and courteous modes of speech. You are expected to say "Hello" when you take down the receiver in answer to the bell, to signify that you are at hand; but you greet an old friend with a pleasant "Good morning," and a mention of his name, just as if you had met face to face.

Novices at the telephone have a hurried feeling and are inclined to omit expressions of courtesy, just as one cuts out unnecessary words in a telegram. It is a mistake to feel that the telephone is for business purposes only, and bad form to be brusque over the wire. In speaking face to face we have the advantage of facial expression; a smile may make a curt remark courteous, or soften a refusal; but in telephoning, words and tones are our only means of expression.

In the case of informal calls, the caller and not the hostess is privileged to bring the call to an end; in like manner, the caller over the telephone is the proper person to say good-by. Have you ever heard a telephone communication dragged out between two people, each of whom is waiting for the other to ring off? Of course, common sense dictates that the person called up may excuse himself, if the talk is unduly prolonged, and not remain glued indefinitely to the receiver, a slave to good form.

Formal invitations are not properly given or acknowledged by telephone. One would not telephone an expression of sympathy to a bereaved family, or of thanks for a wedding gift. The telephone, like the typewriter, is an accepted convenience, a useful member of society, but not quite an honored one.

Finally, the etiquette of calls holds good in the matter of telephone calls between men and women. It is not good form for a young woman to call up a man, either at his home or at his office. Of course, in the business world, no such rule can be observed, and even in the social world a matron can do the convenient thing without loss of dignity. The rule is a flexible one and must be modified by common sense. But a young girl would be wise to conform to it strictly and especially to avoid telephoning an acquaintance at his office. Such a proceeding is not only bad form but bad policy. It is sure to be an interruption; it is quite likely to be embarrassing, and above all this is the fact, that a tactful girl will avoid all appearance of pursuing the man of her acquaintance.

Here are a few hints for those who have the telephone habit. May they read, mark, learn and inwardly digest:

It is not good form to listen to other people's conversation on a party wire. Neither is it honorable. But those who need this hint most will probably heed it least.

It is not good form to hold a party wire to the exclusion of other subscribers. Selfishness is never good form. Those who have waited for a chance to send a really important message, while the fluffy-haired girl next door told her chum about the dance last night, and what all the girls wore, and what "he" said to her in the carriage, will consider this hint a valuable one.

It is not good form to use profane language over the telephone, even in the case just cited. Besides—and this is an even better reason—it is contrary to the telephone contract and sometimes means an extra charge on the bill!

It is not good form to treat Central with discourtesy—nor is it the part of wisdom. Use a pleasant tone, and say "please," and "thank you," and since, in spite of evidence to the contrary, Central really is human, you will get better service as a result.

TELEPHONE ORNAMENTATION.

By most people who own telephones it has not been considered necessary to adorn them in any way. The plain wood boxes or simply the nickel instrument and the yards of green cord have suited even the most æsthetic, but now it is beginning to be a fad to make the telephone an ornament as well as a useful affair.

Although the instrument itself can hardly be transformed to suit the individual taste, and though it is not yet possible to have the inevitable green cords covered with some sort of flowered crepe de chene to match the fall, a small wooden table with shelf underneath is the best resting place. The book may be kept on the shelf and the table may be covered with a centerpiece to match the book cover. Shiny leather is not a secure holding for the slippery instrument.

A booth in a home may be made an attractive little nook by putting curtains up at the windows, preferably of some cool mercerized goods. A stool or a chair must be provided with a cushion for the back of the seat and must be made as comfortable as possible for the long waits for "Central." An electric fan in a booth is always an acquisition, for nothing can be warmer than the telephone booth in summer when the door is closed.

THE BERLIN LONG DISTANCE EXCHANGE

A Description of How Toll Business is Handled at the German Capital

By Dr. Alfred Gradenwitz

THE interurban telephone traffic has been increasing rapidly in the course of late years, and no doubt constitutes at the present moment an important factor in business life. While the construction of the expensive long-distance lines necessary in installing an interurban telephone plant should be rendered as economical as practicable, the switches and other apparatus used in connection with these lines have to be made as perfect as possible.

Whereas the long-distance switches in the case of medium-sized telephone exchanges are arranged in connection with the local switchboards, special long-distance exchanges have to be installed in the case of more extensive plants. Such exchanges have been erected in the course of the last few years in all the more important German cities, and the most extensive of all of them is the long distance exchange of the city of Berlin.

It may be said that Berlin, with its seven large local exchanges, has an extremely lively long-distance telephone business. In fact, the number of daily conversations called for by subscribers to the Berlin telephone system alone is about 6,000, while the aggregate number of long-distance connections actually completed in the course of a day reached the figure of 12,000.

As these increasing demands on the telephone business, in spite of repeated extensions, could not be complied with by existing switchboards, Messrs. Siemens & Halske have had to construct a new exchange, which was inaugurated at the end of last year. This exchange is located on the site of the main telephone exchange, at the corner of Französische Strasse and Oberwallstrasse, in a specially constructed sky-light hall, and has a capacity of 500 long distance conductors, 252 of which have been so far laid. These conductors are handled by the aid of forty-two long-distance switchboards for day service and four switchboards for the night service, thirteen calling switchboards and one distributing switchboard.

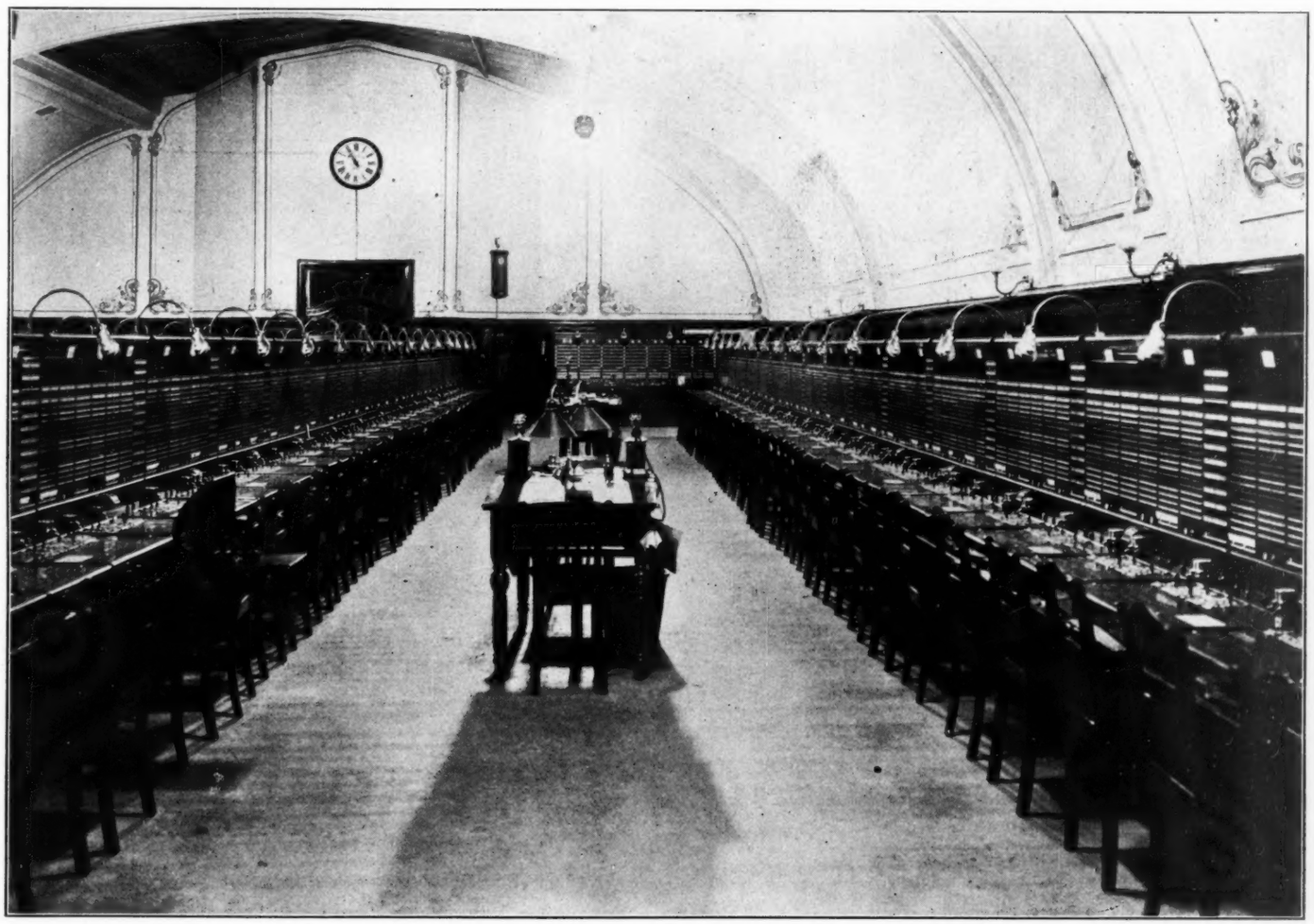


Figure 1.

The long distance switchboards, illustrated in Figure 1, comprise each two operators' seats, and each of these is designed for handling three long distance conductors. The front surface of the upper part of the switchboard comprises the jack panel, in front of which, on a projecting plate of the lower part, there are fitted the apparatus required for completing connections, such as jacks, switches,

keys. Glowlamps, arranged either below the jack panel or on the plug board, are used for ringing up and for giving the "finish" signal. Below this plate, which at the same time serves as desk, there is a box for documents. Between the two operators' seats of each long-distance switchboard there is arranged a pneumatic dispatcher and receiver for conveying the conversation bills.

Calls for long-distance connections from subscribers to the Berlin telephone system are received at the calling exchange (Figure 3), which comprises thirteen switchboards with two operators' seats each. Each of the seats of these switchboards is connected at a special distributing switchboard visible in front of Figure 2, with the calling conductors coming from the various city exchanges, and which are applied at this distributing switchboard to the calling lamp and jack.

Between 9 p. m. and 7 a. m. the long distance connections are effected by means of four night service switchboards with two operators' seats each (Figure 2). As the night business obviously is far less extensive, each operators' seat is able to handle thirty long distance conductors. These switchboards are used as calling switchboards during the day time. The conductors are switched over from the day service switchboards to the night service switchboards and vice versa, by means of a special switchboard, illustrated in Figure 4, and which at the same time serves for testing and measuring. All the relays required for operating the existing signalling lamps (calling, finish and checking lamps) as well as the fuses, are joined on a relay frame.

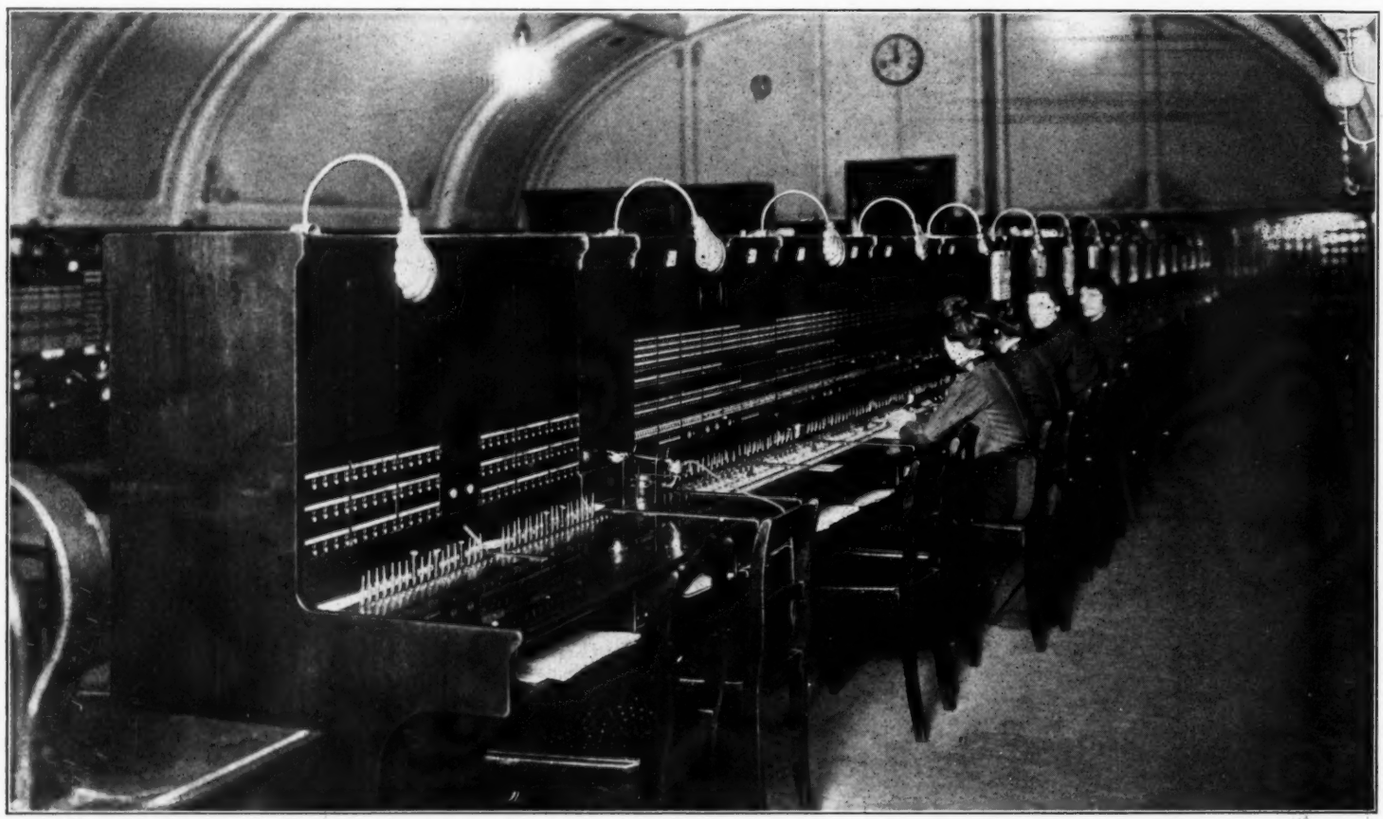


Figure 2.

In order to illustrate the service, the process of completing a connection in the event of a subscriber to the Berlin system requesting a connection with a distance station is briefly outlined as follows:

The subscriber, as usual, calls up his local exchange, which connects him over a calling conductor with the distributing switchboard of the calling exchange. The calling and checking lamps of the latter will be lighted, and the operator will place a disengaged connecting plug into the jack situated above the lighted calling lamp, thus connecting the subscriber with the calling panel in question. At the distributing switchboard there will be lighted a red superintending lamp, while the calling and checking lamps will be extinguished, and the calling lamp will be lighted at the calling panel. The operator in charge of the latter then turns round the lever of her switch, thus connecting with the calling subscriber. Her calling lamp will be extinguished, as well as the red superintending lamp at the distributing switchboard, while a white "busy" lamp being lighted then advises the operator at the distributing switchboard that the subscriber and the calling exchange have been connected. The operator in charge of the calling switchboard now receives the subscriber's request, and after filling in the calling bill, informs the subscriber that as soon as the connection can be completed due notice will be given him. She then places the switch in its position of rest, and a green "finish" lamp is lighted at the distributing switchboard. By removing the connecting plug, the finish signal is transmitted to the local exchange and the finish lamp at the distributing switchboard is put out. In the meantime the operator at the calling switchboard has placed the filled-in bill in the pneumatic dispatcher, whence it is automatcially conveyed to the central station, which likewise conveys it by pneumatic mail towards the long-distance panel in question.

Whenever the subscriber wishes to be informed at what time the desired connection may be expected to be available, or whenever any other information from the long distance exchange is requested, the operator of the calling switchboard places herself in immediate communication with the long-distance switchboard in question across some exchange line.

The arrangement of a special distributing switch will afford the advantage that any order for a long-distance connection received at the calling exchange can be trans-

ferred immediately to some disengaged operator's seat, thus allowing of a regular distribution of work to the various operators' seats of the calling exchange, and securing a smooth handling of the whole business.

switchboard panel of the local exchange and informing the operator in charge of the latter of the subscriber's number. This operator now rings up the local subscriber, while at the same time informing the long-distance operator of

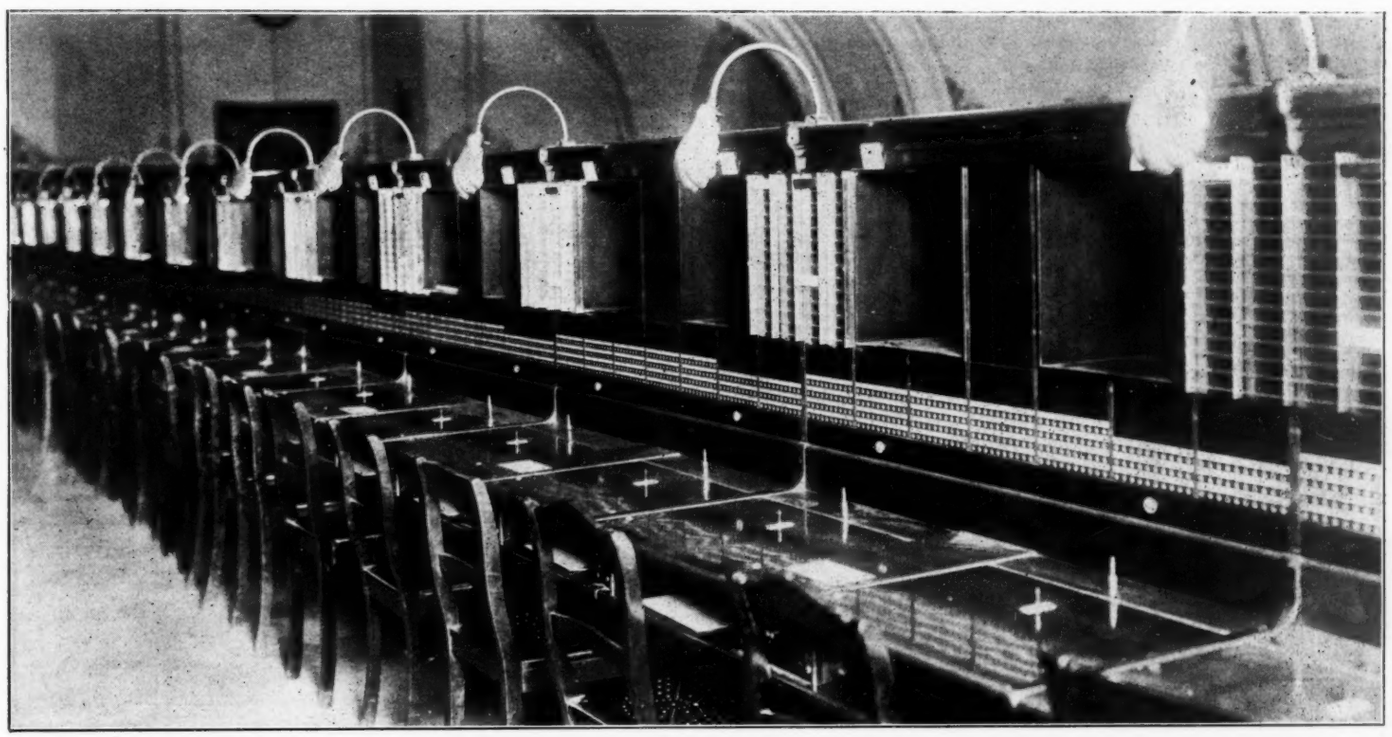


Figure 3.

As soon as the desired connection can be completed, the operator in charge of the long-distance switchboard will press down the key of some exchange conductor leading to the local exchange of the subscriber, thus ringing up the

the number of the local-connecting circuit to be used, and by inserting her inquiry plug into the local connection jack, connects herself with the local subscriber. After the subscriber has answered the call, the long distance plug

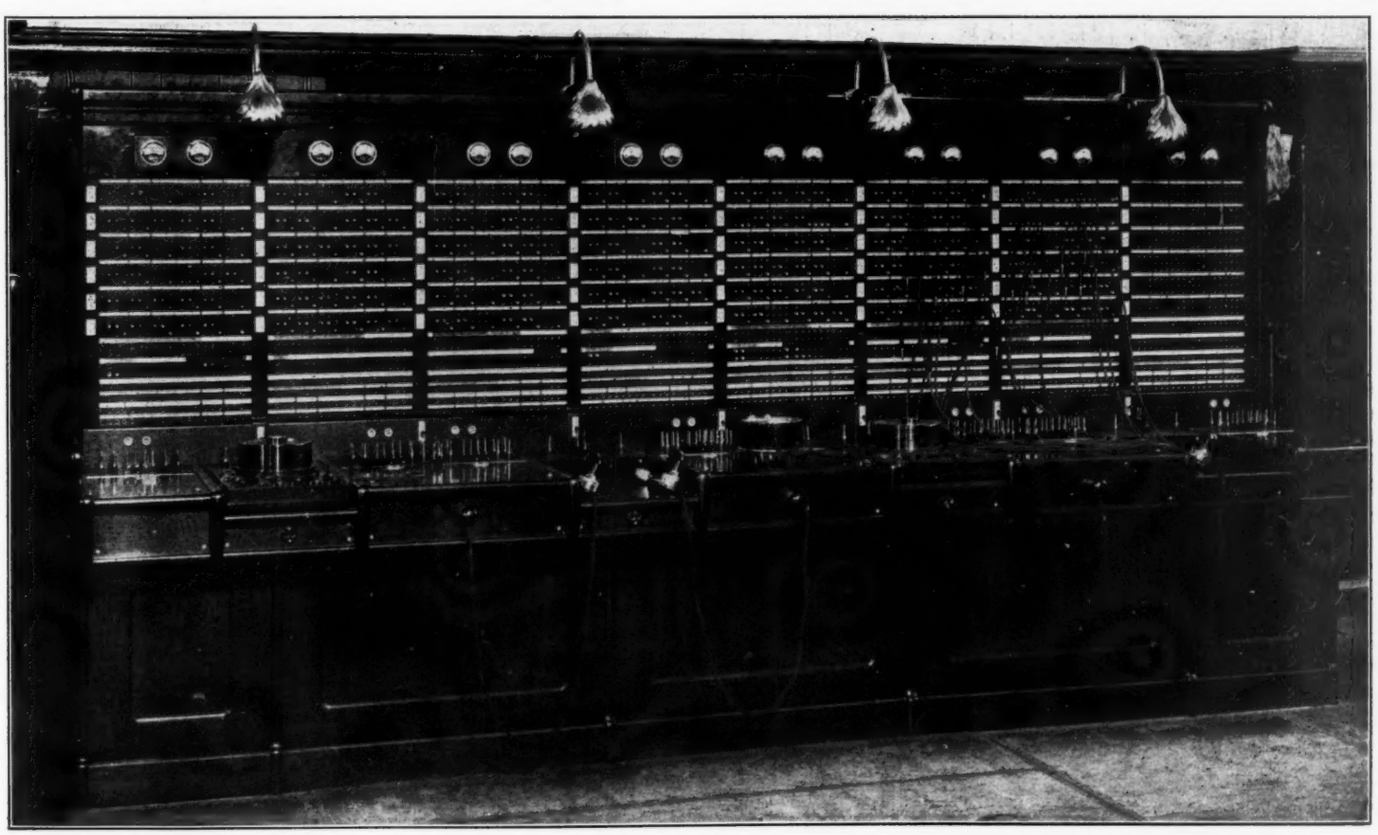


Figure 4.

is inserted into another local conneetion jack, while turning over the transmitting switch, when the connection will be completed. As soon as a conversation has been started, the operator cuts herself out of circuit by removing the inquiry plug.

After the conversation has been concluded, the "finish" lamp at the long distance panel will be lighted, and by withdrawing the long-distance plug the "finish" lamp will be extinguished, while the "finish" signal now appears at the intermediary switchboard panel of the local telephone exchange, after which the connection is severed there also by removing the plug.

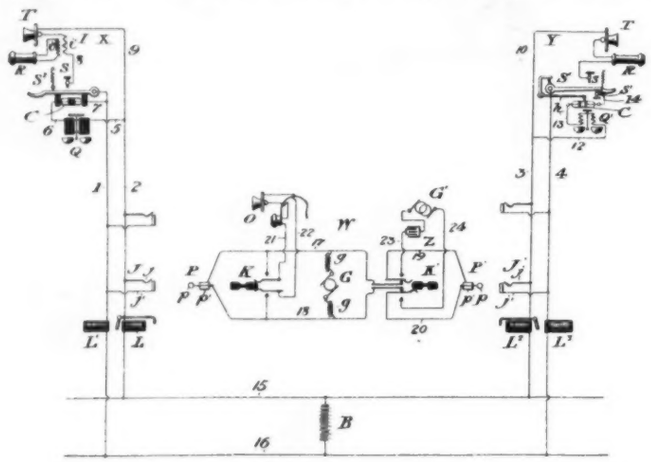
The operator at the long distance exchange, after completing a connection, puts down on an order bill any remarks as to the completion and duration of a conversation. This bill is placed in the pneumatic dispatcher, whence it is automatically conveyed to the checking and collecting post.

DIGEST OF TELEPHONE PATENTS

By Edward E. Clement

860,874. Ringing and Listening Key. Knight. The table has a frame which has a pair of diverging arms and projects downwardly, supporting a pair of vertically arranged contact springs. One of the arms has an integral extension lug to which the operating lever is pivoted and on either side of the frame are disposed the operating rollers which work between the arms. Patent assigned by mesne assignments to the Century Telephone Construction Company.

860,902. Telephone Exchange System. Clement. The battery is kept constantly charged and a balance of potentials is produced on the line signals by bridging the oper-

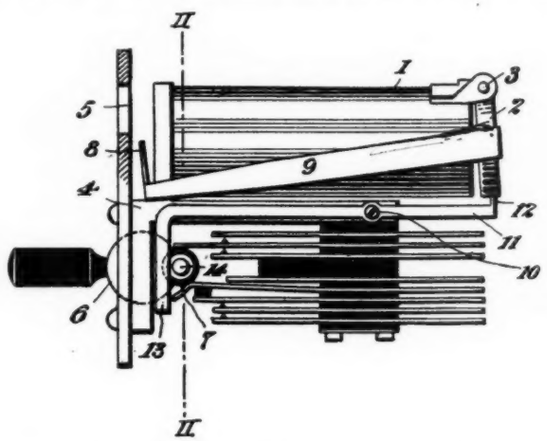


ators' cord circuits on to the main generator, through impedance coils, so that when a connection is made with the line, like poles of the generator will be opposed to like poles of the secondary battery. Patent unassigned.

860,920. Lockout Device for Telephones. Kneisley. A suitable sender is provided at each substation and also a selector mechanism. The latter has a vertically movable notched bar with one of its notches larger than the rest, the large notch corresponding to its particular substation. The dog which engages the notches drops into the enlarged notch when the requisite number of impulses have been sent, closing the ringing circuit, and also releasing the switchhook, so that the talking circuit may be closed. By this means all the other stations on the line are locked out. Patent unassigned.

861,125. Simultaneous Transmission of Telegraphic and Telephonic Impulses. Kitsee. The secondary of the induction coil is shunted to render certain circuits opaque for telephone currents when it is desired to send telegraphic impulses. A pair of condensers representing five microfarads is included in the shunt circuit. Either a full metallic line or one grounded conductor with opposing parts of the line insulated from each other but in inductive relation may be used. Patent unassigned.

861,001. Visual Signal and Key. Turner. The armature of the magnet is locked by a lug on the end of a lever when the switchboard shutter is raised. The opposite end of the lever is arranged to be engaged by the roller of a



listening and ringing key. The armature is released and the lever is restored when the key is operated. Patent assigned to the General Acoustic Company.

861,340. Telephone Apparatus. Winston. The purpose of this arrangement is to provide a means for preventing what is known as the extra current or "kick" of a magnet coil from affecting other pieces of apparatus which happen to be in the same circuit. This is effected by placing a non-inductive resistance in parallel with the magnet winding. Patent assigned to the Kellogg Switchboard & Supply Company.

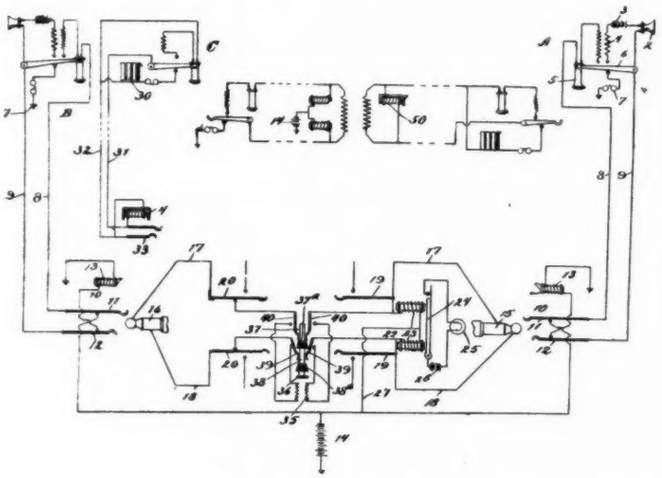
861,357. Device for Locating Defects in Telephone and Telegraph Lines. Buttler. This is a testing device for linemen comprising a box containing the transmitter, generator and jack springs with a switch operating mechanism for the jacks projecting above the top of the box. Patent unassigned.

861,459. Telephone Attachment. Gross. The object of this device is to enable the user of the instrument to speak to a party other than the one to whom he is talking over the telephone without being heard by the latter party. It consists of an elongated apertured plate to which the mouth piece is secured and which slides in a grooved member secured to the transmitter front plate. The mouthpiece may be moved laterally and the plate to which it is secured will close the mouthpiece opening. Patent unassigned.

861,587. Sectional Electrical Switchboard. Graves. The bus-bars of this switchboard are arranged so that they can be secured together in a level line. The bus-bars of

one section are adapted to lock over and have their ends seated in depressions of the adjacent preceding sections. Patent unassigned.

861,808. Telephone System. Clausen. A repeating coil, both terminals of which are normally disconnected from



the cord circuit, may be introduced into the latter by means of a switch which severs the cord circuit and at the same time brings in the repeating coil so as to provide an inductive connection between the two parts of the cord circuit. Patent assigned to the American Electric Telephone Company.

861,809. Telephone Switchboard Apparatus. Clausen. The listening keys in this system are normally short circuited by impedance coils and in the establishment of connection between the subscribers' lines, the spring jacks are arranged to be connected with the cord circuit. Each spring jack has an outer contact which constitutes a part of both the talking and the busy test circuits. Patent assigned to the American Electric Telephone Company.

862,072. Switchboard Construction. Hammond and Hammond. This device is designed for use in a single wire system. A number of jacks and looping plugs are provided and any one of the jacks may be made part of a looping or a patching connection. Patent assigned to the H. R. & K. Manufacturing Company of New York.

862,242. Telephone Attachment. Endean. This device comprises a sheet metal frame shaped to provide a ledge or desk and an upwardly extending support for a card index. A roll of paper is disposed beneath the card index with its outer end passing over the ledge or desk. Memoranda from said card index are transcribed upon the paper and torn from the continuous roll. Patent unassigned.

862,334. Coin Collector. Holmes and Craft. This device consists of a coin chute arranged to receive a number of coins in succession with stops arranged to arrest the coins at different places in the chute. Coin receptacles are provided and an electromagnet discharges the coins into the proper receptacle. Patent assigned to the Western Electric Company of Chicago.

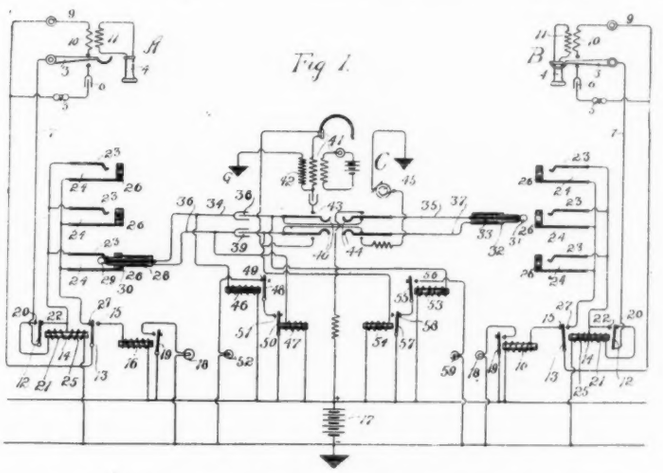
862,449. Hook Switch. Craft. This switch comprises a mounting plate which supports upon its rear side a pivoted switch lever and switch springs. The switch lever projects through an opening of said plate, the plate forming stops to limit the movement of said lever in both directions. Patent assigned to the Western Electric Company of Chicago.

862,497. Holder for Telephone Receivers. Mogridge. This device comprises an arm having a flexible strap to engage the transmitter. A second arm is hinged to the first arm and is adapted to hold a receiver. The first mentioned arm extends in advance of the hinged connection and forms a rest for the hinged arm when the receiver is in use. Patent unassigned.

862,580. Relay. McBerty. An adjustably mounted screw having an unthreaded end portion passes through the magnet armature to keep the latter from being unseated. A shoulder on the end portion acts as a stop for the armature. Patent assigned to the Western Electric Company of Chicago.

862,616. Telephone System. Dean. In this system a relay in the talking circuit is operated by a flow of current caused by a resistance included in a third conductor connected with one side of the line. A source of current is bridged across the line during conversation and the third conductor is also connected with the opposite pole of said source from that with which the said side of line is connected. The relay serves when actuated to open the third conductor. Patent assigned to the Kellogg Switchboard & Supply Company.

862,713. Telephone Exchange System. Conner. In this system a cut-off relay having two differential windings is normally serially included on one side of the substation line. A line signal is controlled by switching apparatus



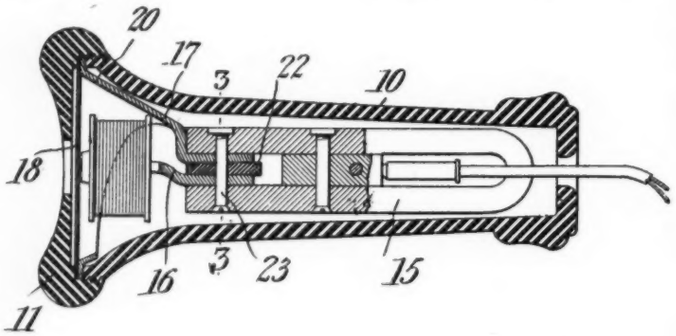
at the substation and when the cord connecting apparatus is connected with said line a circuit is closed through the relay which is actuated and disconnects the line signal, thereby destroying the substation control of said line signal. Patent assigned to the Stromberg-Carlson Telephone Manufacturing Company, of Rochester.

862,909. Receiver Holder for Telephones. Helman. This holder consists of a bracket having an adjustable arm pivoted thereto. Folding arms are hinged to the pivoted arm and an extension having resilient clips is secured to the folding arms. Supports for the adjustable arms are provided. Patent unassigned.

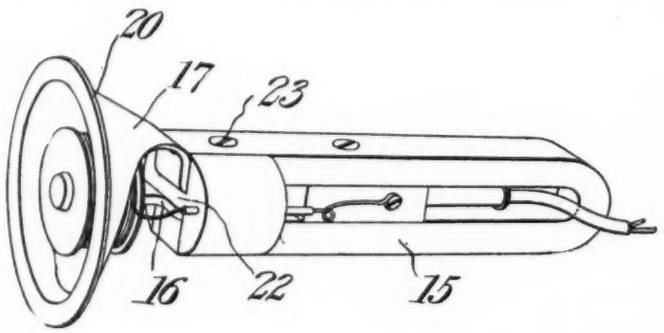
863,230. Telephone Repeater Circuit. Shreeve. This is a current reinforcing system comprising a main line provided with terminal station telephones, relay apparatus having an element provided with a winding in the main line in series with the terminal stations and an artificial line associated with the relay apparatus, and possessing electrical properties similar to those in the main line. Patent assigned to the American Telegraph & Telephone Company.

863,247. Method of and Apparatus for Transmitting Electrical Energy. Yeatman. This is the method of transmitting electrical energy by impressing voice current upon a conductor consisting of a proper core directly surrounded by a longitudinally continuous iron sheet of high permeability. Patent assigned to American Telegraph & Telephone Company.

863,253. Telephone Receiver. Bankhead. This is a bipolar receiver in which the diaphragm forms part of the



magnetic circuit. One of the pole pieces is so shaped as to form a seat for the diaphragm and serves further as a



means for supporting all of the metallic parts of the receiver within an insulating shell. Patent unassigned.

863,338. Telephone Trunk Circuit. Winston. In this system a trunk circuit terminates at one end in a two-strand cord and plug, and at the other end in a three-point jack. A three-strand cord circuit is adapted to be connected with the latter end and a signal in the third strand is displayed when the cord is connected with the three-point jack, and a relay in the talking strand of the cord circuit is adapted when actuated to efface the signal. Patent assigned to the Kellogg Switchboard & Supply Company of Chicago.

RAISING TIMBER FOR PROFIT.

In some localities the experiment is being tried of growing trees for poles and posts. The United States department of forest service issued the following report on the subject August 10:

"Reports from all parts of the country show that the past season has undoubtedly been characterized by a more extensive planting of forest trees than any previous year in the history of the United States. The work is progressing very favorably in every state in the Union. It has been most extensive in California, in the great middle west, and in the New England states. But even in the south, where planting has been more or less limited because of existing natural forests, the scope of the work has greatly broadened.

"The trees planted have been mainly hardwoods. Several large nurserymen, however, report greater sales of conifers for forest planting than they have ever made before. In the middle west catalpa, black locust, Osage orange, and Russian mulberry were the favorite trees; in the north and northeast preference was given to white pine, chestnut, larch, and spruce; in the south the native conifers held the lead; and in California, where the immense annual planting area has been increased to at least five times its former size, eucalyptus had practically a monopoly. A few figures readily show the value of forest planting from a commercial standpoint. In Pawnee county, Nebraska, a 16-year-old catalpa plantation gave a net return of $152.17 per acre at the time the plantation was cut. This meant an annual profit of $6.24 per acre. A 10-year-old plantation of the same species in Kansas showed a net value of $197.55 per acre. Still another plantation, in Nebraska, gave a net income of $170.50 per acre when 14 years old, which amounts to an annual income of $8.69 per acre. Several equally striking cases could be cited throughout the entire middle west, and it is known that where the catalpa will succeed no other tree will pay so well. Good soil and moisture conditions are, however, essential for success with this tree.

"Osage orange has been known to produce as high as 2,640 first-class posts and 2,272 second-class posts per acre, and it is well understood that no posts are better than those of Osage orange. Land producing such a forest as this could hardly be put to a better use, since timber is the easiest of all crops to raise and from now on will never go begging for a market.

"Red cedar in plantations 25 years old has reached a value of $200.54 per acre. European larch used for fence posts or telephone posts reaches an average value of $200 to $300. White pine plantations 40 years old have exceeded a value of $300 per acre, and it is known that the eucalyptus, even when grown for fuel alone, can compete as to profits with oranges. It does not take a lifetime to get results. Catalpa often reaches a post size in from eight to ten years, and will give service as a post for from fifteen to forty years. Osage orange, which reaches post size in from twelve to fifteen years, usually lasts longer than catalpa. Black locust, though badly affected by the borer in some regions, grows about as fast as the catalpa and has almost the same post value, while it has the great advantage over catalpa of being able to thrive on poor land. European larch reaches a size suitable for telephone poles in twenty-five years. When treated with preservative it will then last from fifteen to twenty-five years. Eucalyptus makes a heavy yield of fuel in seven years, and the crop should nearly always be cut before ten years. On favorable sites white pine will make saw timber in from forty to sixty years. Already the demand for the timber of this tree shows conclusively that the investment will prove immensely profitable.

"In every region of the United States there is at least one forest tree, and generally there are several forest trees, which can be planted with a complete assurance of commercial success if the plantation is properly established and given proper care. The government has made a very careful study of most of the forest plantations in the United States. Its publications on tree planting may be had free of charge upon application to the Forest Service, U. S. Department of Agriculture, Washington, D. C. The studies on which they were based were made especially for the benefit of farmers and other land owners, and to prevent the waste of thousands of dollars annually lost by planting the wrong forest trees or by improper care of plantations. From the manner in which our natural timber has been cut it is clear that each region will have to be made as nearly self-supporting in timber growth as possible. The lesson of the past is that the right forest trees grown in the right way will bring a big profit."

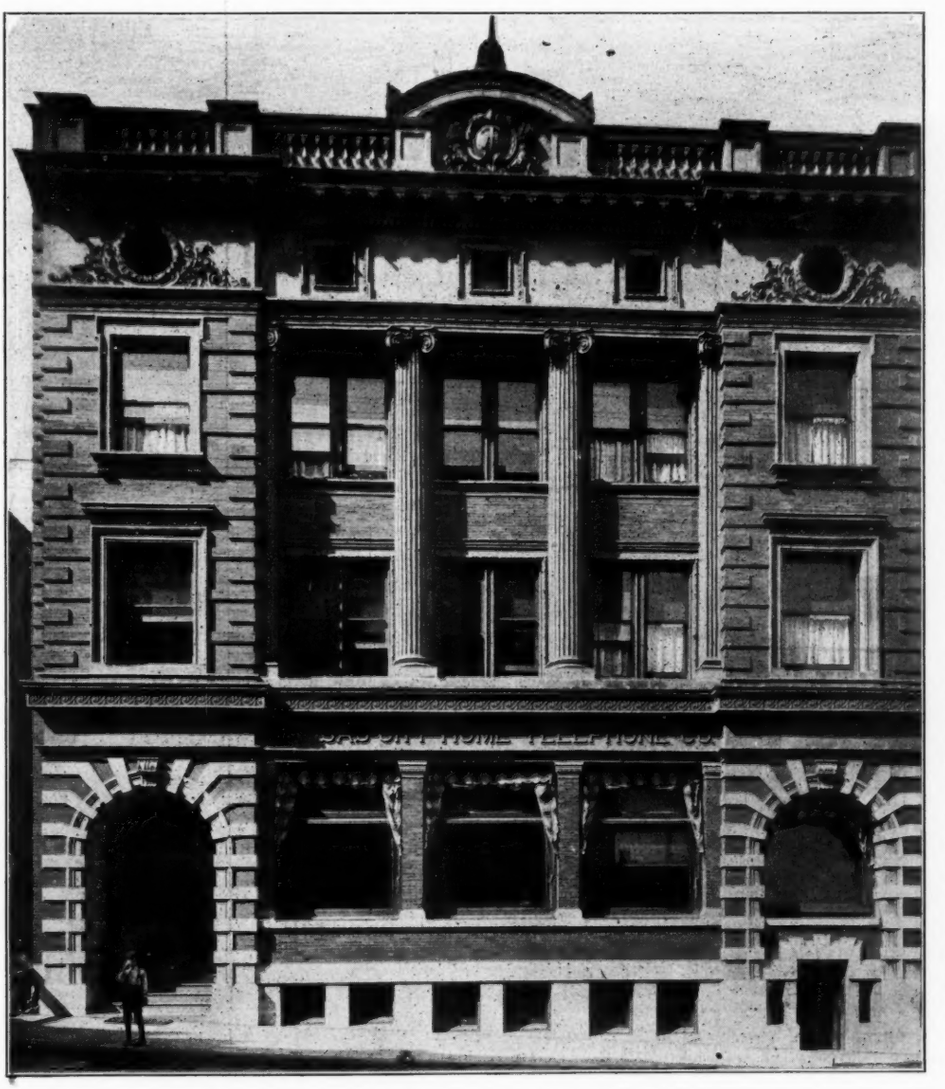
The Wisconsin Telephone (Bell) Company has proposed a combination with the Fox River Valley Telephone (Independent) Company, but the latter has rejected the offer. The Fox River Valley Company has exchanges in fifty-one cities and towns and the Bell's purpose was to head off Independent extension of toll lines by means of a merger. The Fox River Company is planning to build in Kaukauna, Neenah, Menasha and Oshkosh and connect with Independent lines at Fond du Lac and on into Milwaukee.

HOW MONOPOLY LOST IN KANSAS CITY

Brilliant Record Made by Independent Telephone Men Who Defeated the Bell in the Missouri City

By C. D. Wright

WHEN the Bell interests, under the name of the Missouri & Kansas Telephone Company, took possession of Kansas City twenty-five years ago, it was with the firm belief that nothing short of a miracle could prevent their exclusive and permanent control of the telephone business in the middle west. From the time of securing a patent every precaution had been taken to preclude the possibility of competition and the power of the corporation had been strengthened by all available means. Numerous attempts to install Independent plants had proved disastrous. Boston men whose word was law did not hesitate to punish "infringements," and here and there over the United States the glow of burning equipment brightened the sky. A shameless display of influence in so-called courts of justice and frequent examples of too enterprising firms that had dared to test the validity of the "rights" of the monopoly were serving the purpose of intimidation.



Building of the Kansas City Home Telephone Company.

With an economy born of certainty that patrons must accept anything provided or dispense with the means of rapid communication altogether, the company established in Kansas City a small exchange supplied with inferior apparatus. Business grew with the increase of population, but there was no improvement in the execrable service. For years metallic circuits were practically unknown in Kansas City, although in use elsewhere; the instruments furnished were old-fashioned box transmitters condemned and taken out in other cities; switchboards consisted of scraps or half-worn pieces reunited by incompetent electricians. The highest possible rates were charged, $96 per year being the price of a business telephone while residences were assessed in proportion. Until the advent of the Home company, Kansas City, undoubtedly, had the poorest telephone service of any city in the world.

Various projects for the relief of the situation failed, obstacles being swept aside with apparently little difficulty, and the reins were tightened until the people, driven to desperation, were ready to pray for deliverance from any source.

Whenever inquries were made with a view to securing a franchise, in one way or another, the plans were defeated. The Bell people seemed to be in full control of affairs. However, the common council once did pass an ordinance conferring upon certain parties the right to embark in the telephone business and fixing rates, but Mayor Jones vetoed the measure, alleging that two plants would be a detriment. His decision aroused the indignation of citizens. The matter was taken into politics and became an issue in the succeeding election.

Mayor Reed, the new chief executive, entered upon the performance of his duties with a determination to alter telephone conditions, and it was largely through his efforts that the Home company obtained recognition. The two houses of the council were not, on the telephone question, divided along strictly party lines. For some time the Bell trust managed to prevent the enactment of a law permitting a new company to install an exchange, despite the fact that in most instances the terms offered were favorable in character. At length a franchise was awarded to specified promoters, but they failed to accept it within the required period. The collapse of the enterprise was believed

to be due to the machinations of Bell agents, and it was rumored that a substantial cash consideration figured prominently as the cause of the forfeiture.

The terms of the Enoch ordinance, which, after a prolonged battle, was passed, were particularly desirable, but its projector had not the financial support necessary to deposit the amount required as a guaranty. At the critical time certain well-known builders of Independent telephone exchanges in other parts of the country came forward and provided the money. The committee appointed by the mayor to receive the security consisted of Judge Francis M. Black, formerly a member of the supreme court of Missouri; C. O. Tichenor and O. H. Dean, both eminent attorneys of the state. The next difficulty encountered was an assignment of rights by Enoch to a company of St. Louis capitalists, supposedly another device of the enemy. When the mayor, with remarkable tact and judgment, had overcome all obstructions, the franchise with the following rates, carried:

Within one and one-half miles of Twelfth and Main street intersection, not to exceed $54 a year for business telephones, with an additional charge of $6 a year for each additional mile or fraction thereof. Telephones in residences within two and one-half miles of Twelfth and Main streets, charge not to exceed $48 per annum; and for each additional mile or fractional part thereof, $6 a year. Rentals quarterly in advance. Telephones furnished to the city at the rate of $24 per annum.

Immediately the Bell company, now thoroughly alarmed, began a series of manipulations to discourage the new corporation. Enormous sums of money were expended in the betterment of the established system. It was rendered modern in every respect.

The Home company, composed, for the most part, of local financiers, after an advantageous disposal of bonds, installed a plant in accordance with the provisions of the ordinance. To-day, the Independent company has 20,000 subscribers, exceeding by 12,000 the total number of the old company in its palmiest days. Independent toll connections are rapidly becoming all that could be desired. The Bell telephones consist, to a great extent, of nickel-in-the-slot machines in saloons, drug stores, hotels and others public places.

The telephone story of Kansas City is, after all, only the story of thousands of other cities and villages in the United States, as far as the tactics of the Bell monopoly are

J. J. Heim, President.
Kansas City Home Telephone Company.

O. C. Snider, Vice President and General Manager.
Kansas City Home Telephone Company.

concerned. The schemes resorted to were almost identical with those employed in other communities. The hand of the eastern dictator was visible in all the arbitrary methods resorted to wherever the octopus had gathered in what it was pleased to consider its own, but the spirit that has invariably distinguished Kansas City was not to be subdued, and Mayor Reed, working in conjunction with her most loyal citizens, overcame, step by step, the barriers placed in the way of Independent telephony, avoiding pitfalls and smoothing down rough places, but always forging ahead with energy toward the attainment of the desired end—the emancipation of the people from monopolistic rule.

POULSEN'S TELEPHONIC MESSAGE RECORDER

Device Invented by V. Poulsen by Means of Which Telephone Messages are Stored or Recorded

THE principle of the latest scheme devised by V. Poulsen, by means of which telephonic messages may be recorded or stored, is based on the magnetic excitation of paramagnetic bodies. A paramagnetic body, such as a steel wire or ribbon, when moved past an electromagnet connected with an electric or magnetic transmitter, such as a telephone, says a writer in the *Electrical Magazine*, is magnetically excited along its length in exact correspondence with the signals, messages, or speech delivered to the transmitter, and when the magnetically excited wire is again moved past the electromagnet it will reproduce the messages in a telephone receiver connected with the electromagnet windings.

The invention finds practical value for telephonic purposes by providing a suitable apparatus in combination with a telephone in which communications can be received when the subscriber is absent, and which, upon his return, can be repeated.

The apparatus embodies a clockwork mechanism to furnish movement of the recording parts. A bow-shaped frame, Figure 1, consists of a piece of tubing bent into shape and having its ends connected by an arm *e'*, mounted to turn on a spindle. The upper end of the bow has a bearing at the middle of the frame, by means of a short stud, which passes through the bow and enters the frame *b*. The rotary motion is imparted to the bow by means of clockwork. A fixed ring, *48*, carrying two annular electrical contacts, *49*, on its upper surface, is arranged immediately below the arm *e'*, and the arm is provided with a spring-mounted pin adapted to be forced into connection with both of the electrical contacts for the purpose of electrically connecting them together.

On the surface of the cylinder, *d*, is wound a steel wire, *g*, in a uniform helix. On one of the arms of the bow is placed a sleeve, *f*, adapted to slide freely up and down on the bow. This sleeve has pivoted to it a magnet holder. The magnet holder is provided with a tailpiece, which is normally pressed upon by a spring, tending to force the poles of the magnet out of contact with the wire, *g*.

When the bow, *e*, rotates it will carry the drum, *17*, with it; but, owing to the action of the brake, *18*, and the wings, *16*, there will be a certain amount of lagging on the part of the drum, which will be permitted by the twisting of the wires, *15*.

The clockwork is normally prevented from rotating by the weight of the armature, *11*, which acts upon the brake, as shown in Figure 1. The brake is released by the electromagnet, *10*, in a circuit with battery, *E*, and a cut-out, *14*, attached to the frame, *b*.

The apparatus so far described is a phonograph, the operation of which may now be referred to.

Let it be assumed that speech or signals are being electrically transmitted over the circuit containing the magnet, that the sleeve is at the lower end of the bow, and that the machine is started by closing the circuit of magnet, *10*. The bow immediately commences to rotate around the cylinder. When the speed is sufficient, centrifugal force acting upon the weight, *p*, will cause the core of the magnet to be thrown into contact with the wire *g*, whereupon the sleeve will be caused to slide upward upon the bow, owing to the spiral arrangement of the wire on the cylinder. At the same time the undulations of current in the circuit of the magnet will vary the magnetism of the magnet, which variations will be successively imparted to the wire, *g*. The message may continue until the sleeve reaches the elevation of the cut-out, whereupon the finger on the sleeve strikes the cut-out and swings it to one side, thus opening

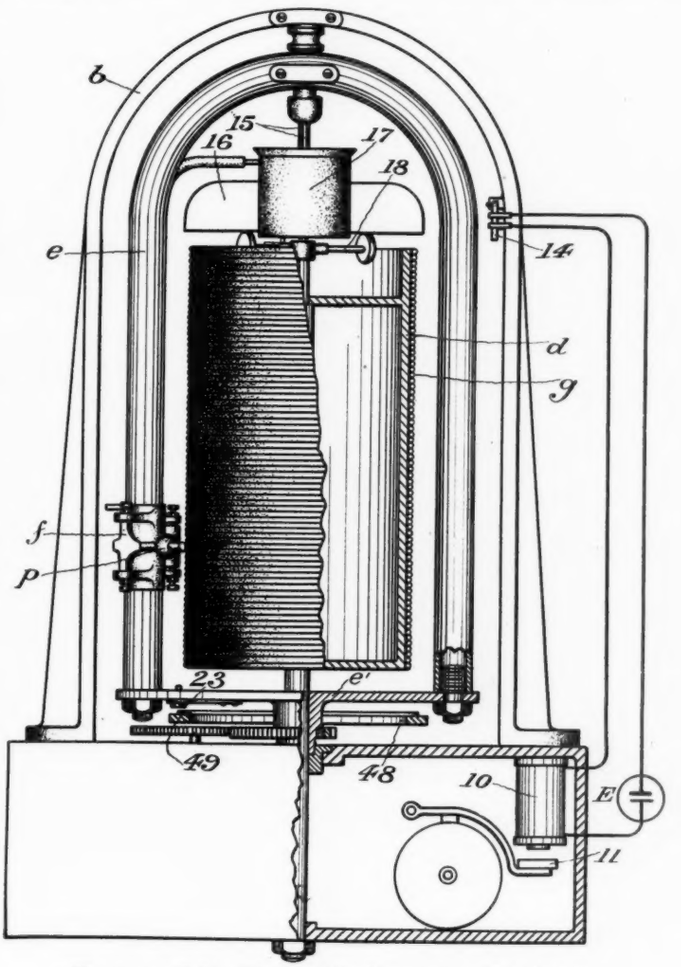


Figure 1—Telegraphone Attachment for Telephones.

the circuit of magnet, *10*. To reproduce the message which has thus been magnetically recorded, it is only necessary to put a receiving telephone into circuit with the magnet, instead of the transmitting telephone, and then start the machine again, whereupon the sleeve will travel upon the bow and the poles of the magnet will traverse the wire *g*, the successively varying magnetic condition of which will react upon the core of the magnet and cause the same undulations of current to be sent over the line to the receiving telephone as were previously sent over the line to the magnet from the transmitting telephone.

The connection of the apparatus to a telephone is shown in Figure 2. A switch, *19*, is provided, having four terminals, *38*, *39*, *42* and *43*. These terminals can be connected with each other in three different ways by means of the switch lever. In the position shown in the diagram the two terminals, *37* and *39*, are connected together. This position establishes the circuit for the ordinary use of the telephone. The two conductors, *35* and *40*, constitute the out-going and return wires.

If the switch lever is so adjusted as to connect the two terminals, *38* and *42*, the apparatus can then be used as a phonograph, and the transmitting telephone belonging to the same station can then be used. To clearly explain this, the course of the current should be followed when the terminals, *38* and *42*, are connected. When the subscriber

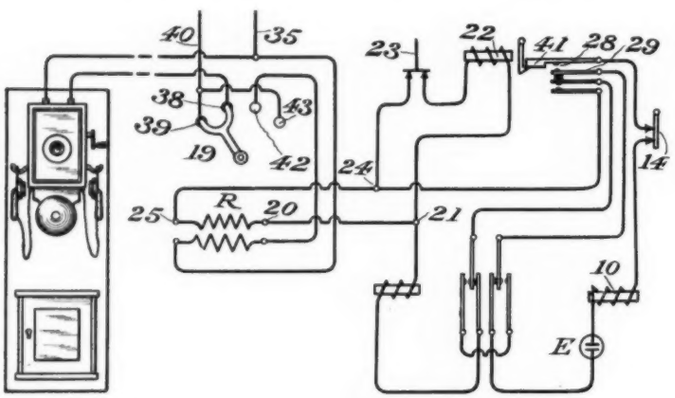


Figure 2—Circuit Connections of Telegraphone.

turns the crank handle of his induction apparatus, a current will pass through the outer coil of the induction coils, *R*. A current is then induced in the inner coil of the induction coils, *R;* the electromagnet, *22*, is thus excited and the armature attracted, whereupon a weighted block, *41*, is released and falls. By this means contact is made between the contact piece, *28*, and spring, *29*, whereby the local circuit of the battery, *E*, is closed through the electromagnet, *10*, which attracts the armature, *11*, Figure 1, so that the clockwork is set in motion and the bow rotated. The sleeve, which has been resting upon the pin, begins to rise, and the connection between the contacts, *49*, is broken. The contact, *23*, consequently exists only for an instant, so that the circuit of the conductors, *21, 22, 23, 24* and *25*, is open during the operation of the clockwork and apparatus. Now during the rise of the sleeve, and while the electromagnet is in contact with the steel wire *g* in the manner described, the subscriber can speak into his transmitter, and the spirally wound steel wire will be correspondingly magnetized. The matter thus fixed can now be transmitted over the line by using the third connection—that is, by connecting with the terminals *42* and *43* of the switch *19*. If, for example, the message, "The subscriber is not at home, but will return at four o'clock," is fixed to the steel wire, the subscriber at the transmitting station now hears through his receiver the message fixed to the steel wire, and knows that in order to speak with the subscriber at the receiving station he must call up at four o'clock.

RAILROADS USE TELEGRAPHONE.

Within a short time every freight and passenger train on the Atlanta, Birmingham and Atlantic railroad will be equipped with the telegraphone, enabling train crews to stop anywhere along the line, on a trestle or in the thick of the woods, and talk to the station ahead as easily as people in town talk with one another over the telephone, says an exchange.

Between La Grange and Oglethorpe, a distance of 100 miles, the Atlanta, Birmingham and Atlantic has already tested and installed the telegraphone system, and Vice President and General Manager George D. Wadley has announced that all trains over the entire road are to be similarly equipped. This fact is one of the most important in the history of railway improvement in the south. In cases of breakdowns and other accidents it is said to shorten delays and, more than that, it will forestall accidents. Instead of having to wait until a cut-in can be made and a telegraph instrument installed, the telegraphones may be brought out and in a few minutes a relief train will be speeding on its way.

The device serves two purposes, telegraphic and telephonic. A message may either be flashed in cipher or be telephoned in. This latter part of the invention consists of a little pole which looks like a jointed fishing rod. On the end of the pole is a hook made to fit over the telegraph wires along the track. All that is required to send a message is to hang the hook over the wire and by means of a button indicate the particular station wanted.

For some time the larger roads of the east have been using the telegraphone with satisfactory results, but the Atlanta, Birmingham and Atlantic is the first road in the south to apply it throughout its system.

TELEPHONE SAVED A LIFE.

Because his employer was able to make prompt use of a telephone, Joseph Horvedt, a harvest hand working on the farm of Ned Hessian near St. Peter, Minn., was saved from a horrible death by snake bite.

Horvedt was shocking rye and as he picked up a bundle the reptile, which had crawled into the grain, struck him like a flash, sinking its fangs into his right forearm a few inches below the elbow. As he dropped the bundle Horvedt saw the snake glide away into the grass, and then he clutched his wounded arm and started for the home of Mr. Hessian. Before he reached the house the poison had begun to act, causing his arm to swell, but Mr. Hessian immediately telephoned to a physician, and, acting under his instructions, bound a ligament tightly about the arm above the wound, administered stimulants and lanced the flesh at the place where the fangs entered, allowing the blood to flow freely.

Horvedt was placed in a buggy and brought to the doctor's office, by which time his arm was swollen to twice its normal size. He was weak and faint and complained of a feeling of nausea, and when slight pressure was applied to the wound, the poison oozed out of the punctures made by the snake's fangs. The ligament about his arm had prevented it from spreading through his system, however, and when the poisoned flesh had been cut away there was a noticeable improvement in his condition.

Mr. Hessian declared that his rural telephone more than paid for itself by the fact that it enabled him to save the man's life.

There are 130 camps and roadhouses in Alaska provided with telephones in addition to many business houses, residences and cabins situated within the limits of the larger camps. The main exchange is at Nome. Skagway and Whitehorse are now connected by telephone.

PROGRESS IN WEST VIRGINIA

Some Interesting Facts Showing How Independent Telephony Has Flourished in that State

By E. M. Rothelle

INDEPENDENT telephony has met with great success in West Virginia. Fifteen years ago, at Clarksburg, an order from the United States court caused Independent telephone equipemnt to be burned on the public square. To-day the Independent telephones are two in number where one of the Bell is to be found in this section.

Among the flourishing companies in the state are the West Virginia Western Telephone Company, with headquarters at Parkersburg, having a capital stock of $1,000,000; the Consolidated Telephone Company, of Fairmont, capitalized at $300,000; the Charleston Home Telephone Company, of Charleston, with a capital stock of $200,000; the Huntington Mutual Telephone Company, of Huntington, capitalized at $200,000, and many others equally enterprising and successful. When an Independent company was formed at Clarksburg, where the bonfire was lighted to satisfy Bell malice, it was a comparatively small concern, but its formation aroused the ire of the Bell interests and a suit was brought alleging infringement of patent rights. The result of the trial sustained the claims of the monopoly, and the offending Independents had their property confiscated and burned by officers of the court in the presence of the general public. However, this did not disturb the promoters, and when a short time later there were other patents issued not infringing on the rights of the Bell they again installed an exchange.

Later the people of Fairmont became interested in the formation of an Independent exchange. This came about in a peculiar way. The Bell had penetrated this section and had an exchange in Fairmont. There were few telephones in use and none at all in Mannington, the most important town in the county outside of the county seat. Captain Prichard, of Mannington, desired to have telephonic communication with the court house, and he asked the Bell people to install a telephone for him at Mannington. They laughed at him for the charming simplicity of his request. Not daunted by the rebuff, he, together with Charles E. Manley, E. F. Hartley and W. S. Haymond, determined to build a line from Fairmont to Mannington, which they did. Others discovered what a fine thing it was to be able to talk between the two towns and they came into the line. From this humble beginning there arose a thriving exchange in the two towns.

After the organization of the company it soon became apparent that it was necessary to extend the area covered. The first extension of territory after the first formation was in Barbour and Randolph counties, where they acquired the Woodford telephone system. This was on November 7, 1901. In April, 1906, the Consolidated purchased the Parsons Telephone Company.

As it is now constituted the Consolidated covers practically all of Marion, Harrison, Taylor, Barbour, Randolph and Tucker counties. In the region in which it operates it owns 3,000 telephones, and it has connections with fully as many more Independent telephones in adjoining counties, making direct connection with fully 6,000 telephones. There are thirteen different exchanges under the direction of the company. They are: Fairmont, Mannington, Fairview, Farmington, Clarksburg, Salem, Shinnston, Wallace, Grafton, Philippi, Belington, Elkins and Parsons.

Nor has all the improvements been in the direction of extension. The attention of the company has been turned to the betterment of its property, and it has neglected nothing that might tend to give the patrons a better service, in fact, the best that is to be had. New toll lines connect all exchanges. They have been installed during the past five years and each of them is a first-class metallic circuit. The Consolidated reaches every postoffice in northern West Virginia, either over its own lines or those of other Independent companies with whom it has amicable relations.

When it was formed there was not a copper metallic circuit in the district in which the company operates. To-day the towns of Fairmont, Grafton, Clarksburg, Philippi, Belington and Elkins are all cabled and cables are to be installed in Parsons and Mannington in the near future. The cost of rebuilding the lines in the towns of Fairmont and Grafton alone cost about $30,000.

The company is now busy installing a central energy plant at Fairmont, with a capacity of 1,000 lines and an ultimate capacity of 3,000. At Grafton the central energy plant will be smaller, but it will be amply sufficient, being capable of taking care of 1,000 lines. A year after the formation of the Consolidated the stock sold at a nominal figure and few people cared much about it as an investment. To-day the stock of the company has grown to a very respectable altitude, and there are many who want it. while there is little or none in the market.

Last quarter the policy of paying quarterly dividends of one per cent was inaugurated. The bonded indebtedness is being met as fast as the bonds fall due and the financial affairs of the company are in a very healthful condition. After the payment of the dividends the remainder of the earnings go back into the plant, thus giving the subscribers additional lines and better service.

The present officials of the Consolidated are: C. E. Manley, president; E. F. Hartley, secretary and treasurer; B. F. Bailey, Grafton, vice-president; John L. Ruhl, director, and J. W. Barnes, director and general manager.

The officers of the West Virginia Western Telephone Company are J. H. Lininger, president; J. E. Carles, vice-president; R. H. Rutherford, secretary; C. T. Hiteshew, treasurer, and A. C. Davis, manager. The company has nearly 3,000 telephones installed, 5,364 miles of underground and 6,894 miles of overhead wires. It operates exchanges at Clarksburg, Salem, West Union, Cairo, Harrisville, Pennsboro, Ellenboro, Auburn, Glenville, Grantsville, Ravenswood, Spencer, Ripley, New Martinsville, Sistersville, Middlebourne, Williamstown, Marietta, Newport, New Metamora and Friendly.

General Manager Davis has just issued his semi-annual report, showing gross earnings for the first six months of the current year to be over $31,000, with gross expenses, including operating, maintenance, interest on bonds, etc., of $21,000, leaving net earnings of about $10,000. The directors, in response to a growing demand for increased service, have voted an issue of $20,000 of treasury stock. the entire amount to be applied to the extension and improvement of the service in Parkersburg, for which a total expenditure of $50,000 was authorized, the balance of $30,000 to be met from the earnings of the business.

Some fifteen miles of cable are to be purchased and installed to reach the suburban districts and also to relieve the congestion in the more thickly populated sections of the city, where the wires are taxed to their utmost capacity. Mr.

Davis states that he has over four hundred orders for telephones on file at this time, and the number is increasing. The work of installing the new cable is expected to begin within a month.

Another important extension of the service, and one which will materially swell the receipts of this company, will shortly be undertaken. This is the completion of direct long-distance connections with Pittsburg. The company has been seriously handicapped in its long-distance service since it first began extending its lines. The new through connection with Pittsburg will be made by way of Wheeling, which city has long enjoyed direct toll line connections with Pittsburg. From Parkersburg the lines will run through Marietta, Ohio, and Sistersville, W. Va., to Wheeling. The West Virginia company is building four circuits between Parkersburg and Sistersville, while between that town and Wheeling construction is being accomplished by the National (Independent) Telephone Company, of Wheeling. As soon as lines are completed to Wheeling connection will be made with the long-distance lines now in operation at that place.

The Independent telephone companies have had a hard fight in West Virginia, but they are so firmly intrenched now that they are stronger than the Bell, and reach fully twice as many people as the latter. Progress has ever been the watchword, and the patrons of the Independents have received better service for less money than they have from the Bell. It is a far cry from the time when telephones were burned by court order on the public square to the present time, when the Independents are in the saddle, yet it is covered by a span of but fifteen years. The rate at which progress is being made at the present, taken with the record of the past, is an augury that the next fifteen years will mark achievements as startling and which read almost like a romance. However, it is cold matter of fact business.

The development of Independent telephony in West Virginia, while it is not remarkable in some sections, in others has had a very rapid growth. There are some eight or ten large strong companies in the state that have a very large volume of business, and these with their allied small companies are doing much to cripple the Bell monopoly until it is forced to give free telephones for a certain period, giving a free residence telephone with a business telephone, and the lowering of rates in certain sections, lower than business can be done for, and in other and various ways to put the Independent telephones out of business. The public cannot be so easily deceived; they know that had it not been for the Independent movement they would be practically without telephone service because of prohibitory rates. The first use probably of an Independent telephone was in 1892 at Clarksburg, when Moore Jackson, C. L. Hickman, Dr. Morgan and others purchased some telephones and started a small switchboard exchange, the line running from Clarksburg toward Weston. Suit was entered by the Bell company and these telephones confiscated and burned by order of the court in the public square. But it was a conflagration that served only to stir the hearts of these people the more, and in 1893 the Clarksburg Telephone Company was organized and the fight renewed.

The total number of Independent telephones in the state is estimated at 14,599, as against 7,342 Bell telephones in the same territory. The number of Independent toll stations is 309, against 131 Bell; number of exchanges, 50, against 24 Bell; total miles of pole lines, 2,014, with Bell not given; total number of miles of wire on telephone lines, 18,422. The gross earnings of the companies represented in the Independent state association aggregate $1,176,775. There are other companies not members of the association with connections with the members which brings the total number of telephones above 20,000, against 10,000 Bell. This growth should rapidly increase because of the fact that the Independent companies are all home institutions, while the Bell is controlled by Pittsburg capital in West Virginia.

The West Virginia Independent Telephone Association is an aggressive, helpful and growing organization. Its officers are A. C. Davis, Parkersburg, president; W. C. Hanlan, of Wheeling, secretary; J. H. Wise, of Cameron, vice-president, first district; second district, William Line, of Morgantown; third district, J. W. Downs, of Buchannon; fourth district, Hugh Amos, of Pine Grove, and fifth district, Lon H. Hutchison, of Huntington. Lloyd Beeghly, of Weston, is treasurer.

The following is the executive committee: A. C. Davis, W. C. Handlan, J. W. Barnes, Lon H. Hutchison, E. K. Hertford.

NEW YORK STATE CONVENTION.

The annual convention of the New York State Independent Telephone Association will be held at Syracuse, N. Y., September 25. The headquarters of the delegates and visitors will be at the Yates Hotel. R. Max Eaton, secretary of the association, has been diligent in impressing upon the members the importance of being present, and a large attendance is expected. Matters of great importance will be discussed and acted on by the organization.

R. Max Eaton, Secretary.
New York Independent Telephone Association.

In 1906 the New York association held its annual meeting at Niagara Falls, and proved to be the best attended convention in its history. The officers elected at that meeting have given the association a successful administration during the last year, and the prospects are equally bright for the coming twelve months. Following are the officers of the New York organization: President, Dr. W. R. Campbell, Niagara Falls; vice-president, C. N. Cowie, Syracuse; secretary, R. Max Eaton, Niagara Falls; executive committee, B. G. Hubbell, Buffalo; J. F. Stockwell, Syracuse; George R. Fuller, Rochester; Floyd W. Dowell, Elmira; T. Harvey Ferns, Utica; G. B. Wright, Jamestown; W. L. Burk, Troy; T. H. Griswold, Plattsburg; S. B. Rawson, Albany; W. H. Johnston, Buffalo.

IMPEDANCE ALONG THE LINE

A Humorous Description of the Obstacles to Tree Trimming

By J. D. Archer

THE manager of the Roseland Farmers' Telephone Exchange sat in his office, his hands thrust deep into his trousers' pockets, and stared blankly at the list of line troubles which had been handed him the evening before by the troubleman.

"Something must be done, and that very soon, or there will be a hubbub in the camp; that's a cinch," he muttered.

Just then the troubleman threw the door open with a bang, stepped in, twirled his cap at the hanger on the wall, took two turns about a chair, dropped into it and began plucking with one hand after the other at the empty air as he recited:

"To *do* or be *done,* that is the question. Whether it is the business of the troubleman to stand for everything that goes wrong along the line and still be good-natured, or to wade in and lick every farmer that opens his bazoo and by putting the 'kickers' out of business end them?"

"What's the matter now, Biggsby?" queried the manager. "Are you seeing things?"

"No, but I've been a-hearin' plenty of them. Every farmer along that north line is growling about bad service. Say they can't hear a blessed thing half th' time and that if they don't get better service by the end of next week they are goin' to have the telephones taken out. Oh, troubles certainly do go in bunches in this business."

"Well, it is just as Carliss said, the trees should be trimmed, but what are you going to do when those fellows it is just like an impedance coil in places and the current all leaks away. We must trim the trees. We must trim those trees, Biggsby, and the sooner the better."

"Oh, certainly, Mr. King, certainly, those trees should be trimmed, but what are you going to do when those fellows will not allow you to touch their precious shade trees, and when it comes to looking into the eyes of shotguns and bulldogs—well, it's just a little out o' my partic'lar line o' business, that's all."

"Well, get some husky Irishman and see that this matter is taken care of as quickly as possible."

"Very well, sir, I'll get the Irishman and put him to work, but I'll bet that same Irishman won't be after lookin' for that same job a second time." And the troubleman swung himself out.

He soon succeeded in getting the man in question and immediately started for the seat of the trouble. For a distance of several miles no trees were discovered which overhung the line in such a way as to do any harm to the line transmission. They halted only long enough to clip off an offending branch here and there.

"Shore an' it looks loike breakers ahead there, lad," observed the Irishman as they neared a farm house situated on a very imposing hill top, which was surrounded by a grove of heavily foliaged shade trees. The telephone line ran directly through the branches of two of the largest of the trees.

"You bet your life, Mike, there will be something doin' here, but it must be done, if we have to commit homicide to do it."

"Shore. Bizness is bizness."

"Well, now, I'll tell you what we will do. You climb up into that first tree and commence sawing off the branches. Make every lick count. I'll stay down here on the ground and if the farmer comes out I'll call to you and then try and tole him away somewhere until you have time to get the business completed. If I tell you to quit work, you quit, understand 'till I get him away out of hearing, and then you like Sam Hill.

"Shore, but if he says come down and p'ints a shotgun my way I'll come down immediately, ye kin depind on thet."

"And if he turns that big bulldog loose I'll come up."

"Yis, and it's pore policy ter hezitate, me b'y," cautioned Mike, as he climbed the tree and began sawing. "And say, better be keerful to bring th' lunch-baskit wid yer. Them bulldogs is sure stayers."

"All right, old man."

The work went on uninterruptedly for some time. One tree had been bereft of the offending foliage and the Irishman had climbed the remaining one.

"Hist, Mike."

"Comin', is 'e? Shotgun or bull terrier?"

"It's a gun sure enough this time. Brace up now; I'll take care of him."

"Oye, lad, be certain to do it. Oye don't care to be made a sieve of fer th' sake o' science."

"Let me alone for that, Mikie."

By this time the irate farmer was upon them, flourishing the gun angrily as he gave vent to his wrath.

"What in th' name o' Solomon aire you fellers a-doin' anyway? Who told you to be a-trimmin' my shade trees. Now, you red-nosed son of a sea-cook, crawl down from there or I'll try this load o' buckshot on yer speckled hide. Crawl down, I tell you, d'ye hear?"

The man up the tree began to look embarrassed.

"Hold on, Mr. Thompson. You wouldn't shoot anyone, would you? We are only cutting off a few of the limbs that overhang the telephone line. We were ordered to do this by th' company. You see, it interferes with the service when the weather is damp and puts too much impedance on the line," argued the troubleman.

"Well, now, I cal'late I'll put some more impedance on that 'are line if that rascal don't clim' down perty shortly."

"Well, business is business, of course, Mr. Thompson, and if you don't want the trees trimmed I presume we will have to give up the job."

"Wall, I cal'late that's the' safest thing to do," replied the farmer, stubbornly.

"Come down, Mike," called Biggsby.

"Thrust me fer that, lad," answered Mike as he moved back along the limb.

"Say, Mr. Thompson, ain't you the man who had the bull-pups for sale a short time ago?" questioned Biggsby.

"I reckon I be th' man," drawled the farmer, curiously.

"Got any of 'em left?"

"Yep. Two."

"Where are they. Maybe I'll buy one."

"I reckon they're in the barn down there. Greatest pups that wuz ever raised in this neck o' th' woods."

"Well, come down then, Mike, and put the tools in the rig and wait for me there in the road."

"Oye, oye, lad, as soon as Oi git me suspinders fixed," answered that worthy from his perch on the limb as he tugged manfully at the buckle over his shoulder.

Biggsby and the farmer went toward the barn. As soon as they were well out of sight Mike moved out onto the limb again and resumed work, and soon had the line swinging clear. He then climbed down and placed the tools in the buggy, as requested, turned the horse's head townward, and waited for Biggsby to return.

Biggsby soon appeared bearing one of the pups in his arms.

"He certainly is a beauty, Mr. Thompson, and no mistake. Won't he be a lammer when he gets his growth. Good-day, Mr. Thompson, I'll tell Johnson about the other one."

"They're real peart critters, you're right. Hope yo' hev good luck with 'im," replied Mr. Thompson as he turned in at the back yard gate and went toward the house.

"All done, Mike?" asked Biggsby in an undertone.

"Shore. Pile in an' let's be off wid us before he's afther smellin' th' mouse. That gun's a wild looker, I'm thinkin'."

"Oh, I fixed that gun, Mike; he won't find it in two weeks where I hid it."

"And ye hid it, lad? Holy Saint Mary, how me heart did palpytate. Shore, an' did ye buy th' dog?"

"Yes. The company needs a mascot, and maybe we can make out to fight fire with fire after a while. Ain't he a beauty?"

"Fight bull-dogs wid bull-dogs, ye mean," corrected Mike. "You're right, he's a darlint, an' hist, lad. He's done a roight smart o' good fer 'is counthry already."

MODERN TOLL SWITCHBOARD EQUIPMENT

The Fourth of a Series of Articles Dealing with this Important Subject

By J. E. Hilbish, J. B. Thiess and G. A. Joy

ARTICLE IV

COMBINATION TOLL TO TOLL AND TOLL TO LOCAL CORD.

THUS far in our description of the multiple toll board we have shown those cord circuits that are adaptable to one class of service only, and as has been previously stated, we do not recommend them, having introduced them only because of their simplicity, thus giving us an opportunity to give more time to the manner of handling toll traffic and less to the narrative of operation of circuits.

A circuit embodying the essential features of the last two described, and which is far superior to either of these, is the combination toll to toll and toll to local circuit shown in Figure 13. This is a universal circuit and is, as its name implies, as well adapted for toll to toll as toll to local service. In its normal condition, as shown in the sketch, the circuit is arranged for toll to local connections, the two subscribers being connected magnetically by means of the repeating coil, battery being fed to the local subscriber through the coils of relays *A* and *B*. The only operation necessary to convert the circuit to a straight metallic connection for toll to toll service is the operation of key No. 5, which cuts the repeating coil, as well as all of the local cord supervisory apparatus out of circuit. The advantages of a circuit of this type have been fully discussed in the first article of this series, and as the operation of the circuit is identical to the last two described, where the conversions, as stated above, have been made by the operation of key No. 5, we will not discuss the same any further.

LOCAL TO TOLL CONNECTIONS.

Our description of the operation of circuits in connection with a multiple toll board up to the present writing has been confined to calls originating at the toll board, and since these have been thoroughly discussed we are now in a position to describe how the toll calls originating at the local board are dealt with. The local to toll connections naturally bring to mind the recording toll operator and her circuits. These, together with those necessary to complete a local to toll connection, are depicted in Figure 14. It will be observed that the recording trunk terminates in jacks at both ends, the local board end being multipled in each section of the board so that the jacks will be accessible to all operators, while at the toll board the trunks all terminate in jacks located in front of the recording operators. The method of handling a local to toll connection is as follows: A local operator having been informed by a calling subscriber that a toll connection is desired, will test the recording trunk jacks until she finds one that is idle, when she will plug into said jack with the calling plug of the pair of cords used to answer the subscriber. The act of plugging into a recording jack will raise the potential of the sleeve of the jack from ground to that of the negative side of battery, thus putting the busy test on these jacks, and at the same time a circuit will be established from battery through the coil of the sleeve relay *D* over the sleeve strand of the plug to the jack and hence through relay *C* to ground. Thus relay *C* will be energized, attracting its armature thereby closing a circuit from the ground on the make contact of relay *C* to the break contact of relay *A*, through the lamp associated with the trunk used, to battery. Consequently this lamp will become lighted, which will attract the recording operator's attention and she will plug

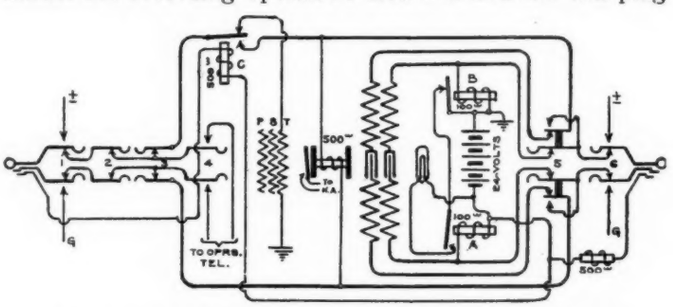


Figure 13—Combined Toll to Toll and Toll to Local Circuit.

into the jack associated with this lamp. The calling supervisory lamp in the local cord circuit will also be lighted, due to the energizing of relay *D*. The recording operator upon plugging into the recording trunk jack completes a circuit from battery through coil *G* and hence over the sleeve of the jack and relay *B* to ground. This will cause the operation of said relay which will complete the two following circuits. First, the attraction of the left-hand armature of the relay will bridge the retardation coil *F* across the recording trunk, which in turn will cause battery to feed out through the coil of relay *E* in the local cord circuit, thus energizing the same, causing the attraction of its armature, and therefore the local supervisory lamp circuit will be broken and the light will be extinguished, thereby informing the local operator that the recording operator has answered

the call; second, the attraction of the armature at the right of relay *B* will close the circuit from the battery on the make contact, through relay *A* to the ground on the make contact of relay *C*. Consequently the armature of relay *A* will be drawn up, the make contact locking this relay by means of the circuit that may be traced as follows: From battery through the coil of relay *A*, to the make contact of relay *C*, thus permanently locking relay *A* until relay *C* is de-energized. The attraction of the other armature will break the lamp circuit, thereby extinguishing the recording trunk lamp. The recording operator will then operate her listening key and obtain from the calling subscriber the number of his telephone, the number of the toll party desired, and any other information that may be necessary to complete a toll ticket. When that data has been obtained she will instruct the subscriber to hang up, informing him at the same time that he will be called as soon as his party can be reached. She will then withdraw her plug, which operation will de-energize relay *B*, thus causing its armature and contact springs to fall back into place. This will open the circuit of the bridged retardation coil *F*, which in turn will de-energize relay *E*, thus closing the lamp circuit in the local cord, which will give this operator a disconnect. The recording lamp will not relight, due to the fact that relay *A* is still energized by means of the locking scheme previously described. When the local subscriber "hangs up," the answering supervisory lamp in the local cord will also light and the operator upon seeing these signals will remove her connections. The withdrawing of the plug from the recording jack will release relay *C*, which in turn will unlock relay *A*, and the apparatus will be restored to its normal condition. The recording operator will then pass the ticket referred to above to one of the regular toll line operators, who will call the party desired, when the call will be dealt with in a manner identical to a regular toll to local connection.

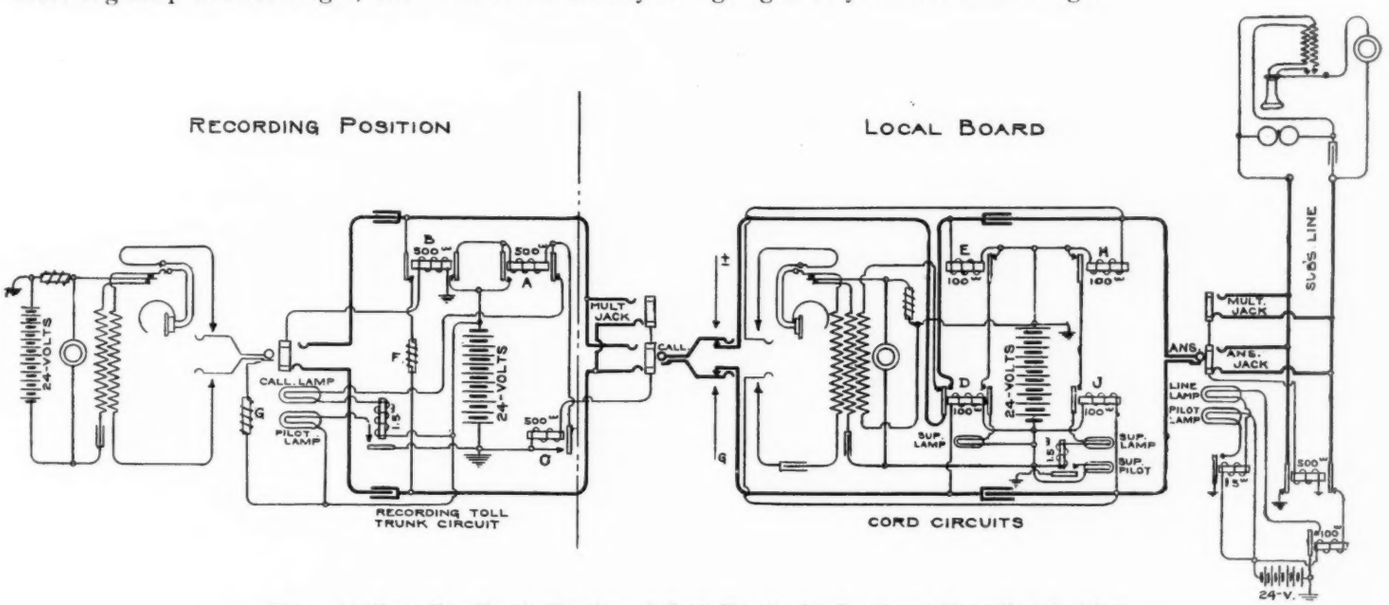


Figure 14—Recording Trunk Circuit and Cord Circuits for Local and Recording Positions.

TOLL AND LOCAL EXCHANGES IN SEPARATE BUILDINGS.

It has been assumed in all of the foregoing, and as could easily be observed from the design of the circuits, that the toll and local exchanges are located in one and the same building. However, it is often very desirable to locate the toll exchange in a building at some distance from the local board. This is especially true in the case of larger cities having a number of local exchanges, that all utilize the same toll board. In this case it is customary to install the toll board in the outskirts of the city in some convenient place along the highway that the majority of toll lines follow. The principal reason for this is that it is more economical and better practice from an operating standpoint to cable the incoming and recording trunks out to the somewhat distant toll exchange, than to loop all of the toll lines into the city, since with the former construction the toll to toll calls will not have to be carried through a city loop, thus obviating this additional length of line for this class of service. Furthermore, in order to give the quality of transmission desirable on toll lines, it is necessary to keep the capacity of the line as well as the line drop and losses, at a minimum, and therefore it is advisable to avoid cable construction as much as possible. Now, since it would evidently be advisable if not compulsory to cable the toll lines into the heart of a city, it will easily be understood that in order to keep up the quality of transmission sought, this cable would have to be of special design, the wires being of a much larger gauge than that used in ordinary telephone cable, and its capacity would also have to be such as not to be much in excess of that found in aerial lines.

From the foregoing it will be obvious that all the circuits, save the incoming and recording trunks, are adaptable to this kind of equipment, these two circuits, however, undergoing a very considerable change.

We will first explain the incoming toll trunk shown in Figure 15, and in this connection we wish to state that this circuit is used in conjunction with the circuits shown in Figure 12 (see April TELEPHONY), this circuit taking the place of the trunk there described, and consequently we will refer to Figure 12 as well as Figure 15 in the following description.

The toll board end of this circuit, as will be observed, terminates in a spring jack, these jacks being multiplied in each section of the toll board, while at the local board it is plug ended, these plugs being located at the toll trunk positions at these exchanges. The method of dealing with a toll to local call, as well as the operation of the above circuit, is as follows: A toll operator having received a request from a toll subscriber for a toll connection, will by means of an order circuit place herself in communication with the trunk operator at the exchange in which the particular local subscribers' line terminates, informing her as to the number of the local party desired. The trunk operator upon receiving this information will test the jack of the line called for, and if the same is free, she will plug into said jack and ring at the same time giving the toll operator the trunk assignment. The plugs used with these circuits are so designed

hat the ring conductor will short circuit the sleeve and ring springs of the jack into which they are inserted. Consequently when the trunk operator inserts the plug we can trace a circuit from the ground on the cut-off relay *D* to the sleeve of the jack and hence, over the sleeve of the trunk plug and cord through relay *D* to battery. Therefore, relay *D* will be energized and will draw up its armatures, the one to the left cutting off the lead to the operator's circuit used for the busy test, and at the same time closing the tip strand of the talking circuit, while the right hand armature

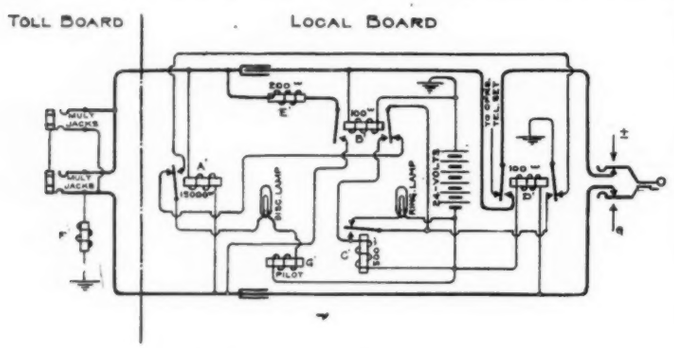


Figure 15—Toll to Local Service Trunk Circuit.

will close a circuit through the "ring" lamp, which will consequently light. The latter circuit is traceable from the ground on the armature of relay *D'* to the armature of relay *C'*, and hence through the "ring" lamp to battery. In the meanwhile the toll operator will have inserted a plug into the jack assigned, thereby causing a very slight flow of battery through the toll cord relays *A* and *B* and the trunk relay *A'*. Due to the high resistance of this relay, the cord relay *B* will not operate, whereas the relay *A'* due to the large number of turns will be energized. Relay *A* in the toll cord circuit will also be energized, since a circuit will be established from battery through the coil of this relay to the sleeve of the plug, and consequently through the retardation coil *F'* to the ground. The operation of this relay will light the supervisory lamp in the toll cord circuit. The operation of relay *A'* above referred to, will have no direct effect upon the signals since the circuit in which its armature closes a contact is still open at relay *D'*, which relay, as has been previously stated, was operated immediately upon the insertion of the toll trunk plug. Therefore, the disconnect lamp will not light since this circuit can only be traced from battery through the pilot relay, the disconnect lamp, the make contact of relay *A'*, and hence to the open contact at the break contact of relay *D'*.

The operation has proceeded thus far to the point where the trunk operator is ringing the local party and the ring lamp in the trunk circuit, as well as the supervisory lamp in the toll operator's cord, is lighted. However, as soon as the local party answers, battery will be fed out to the subscriber through the coils of relays *D'* and *B'*, thus causing the operation of relay *B'*, relay *D'* having been operated previously as explained before. The operation of relay *B* performs two functions: First, the attraction of its left armature will shunt out the high wound relay *A'* by means of the retardation coil *E'* wound to 200 ohms, which will energize relay *B* in the toll cord circuit, causing the attraction of its armature, thereby opening the lamp circuit, which will extinguish this light and inform the toll operator that the party has answered; and second, the attraction of the right hand armature will close a circuit that may be traced as follows: From the ground on the armature of relay *D'* by way of the make contact to the armature of relay *B'* and hence by means of the make contact on this relay through the coil of relay *C'* to battery. Thus relay *C'* will be energized, drawing up its armature which will open the "ring" lamp circuit, causing the same to be extinguished and at the same time locking this relay by means of the make contact, this circuit being traced from battery through the coil of relay *C'* to the make contact of this relay, from where it can be followed to the armature of the same relay, to the contact of relay *D'* and its armature to the ground. The ring light in the trunk circuit and the supervisory light in the toll cords have now been extinguished, informing both operators that the local party has answered, and at the same time a completed talking circuit has been established between the two subscribers. The toll operator will then cut into the circuit with her telephone set and see that the subscribers find each other, when she will operate her calculagraph to time the connection. When the subscribers have finished talking the toll party will ring down a clearing out drop as usual, while the local party will simply hang up his receiver. The act of "hanging up" will open the local subscriber's battery feed circuit and consequently relay *B'* will be de-energized and its armature fall back into place. This will cause the removal of the 200 ohm shunt across relay *A'*, causing its operation, and at the same time robbing relay *B* in the toll cord circuit of battery sufficient to cause its de-energization as previously explained, and hence its armature will drop back, which will light the supervisory lamp in the cord circuit, giving this operator a disconnect signal. The operation of relay *A'* will not have any effect upon the trunk operator's signals, due to the open circuit at relay *D'* and the ringing lamp will not relight, since relay *C'* is permanently locked until the release of *D'*. However, when the toll operator receives her disconnect signal she will remove her plug, which will rob relay *A'* of its battery and its armature will fall back. This will close a circuit that may be traced from battery through the pilot relay and the disconnect lamp, the armature and back contact of relays *A'* and *B'*, and hence to the make contact and armature of relay *D'* to ground. This will cause the lighting of the disconnect lamp, which will give the trunk operator a disconnect. Consequently she will remove her plug, which will release relay *D'*, which in turn will de-energize relay *C'* and restore the apparatus to its normal condition.

LOCAL TO TOLL CONNECTIONS.

There is now but one class of service which has not been explained in connection with the multiple drop toll board,

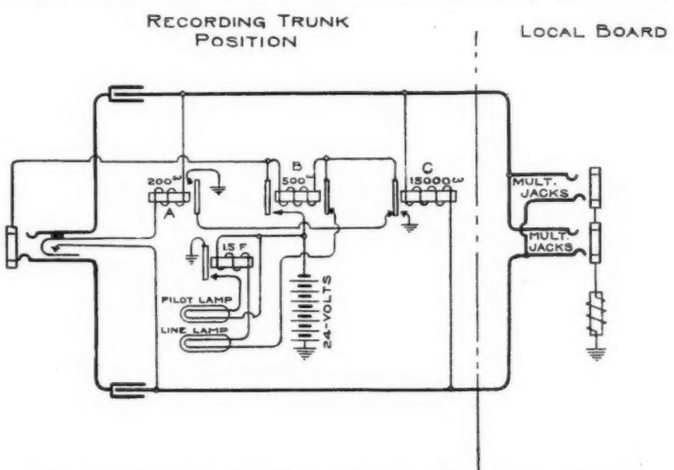


Figure 16—Local to Toll Two Wire Recording Trunk Circuit.

namely, the local to toll connection for exchanges that are located in separate buildings. The circuits used for this kind of service, as the toll to local connection previously described, are all identical, with the exception of the recording trunk which is shown in Figure 16. Therefore, this circuit can be substituted in the place of the trunk circuit shown in the completed connection in Figure 14, and we will consequently refer to these two mentioned drawings in the following description:

The local board end of this trunk circuit as shown termi-

nates in a multiple jack in each of the regular multiple subscribers' sections, so as to be within easy reach of all of the local operators, whereas the toll board end of these circuits all terminate in jacks and lamps in front of the recording trunk operator. When the local operator is informed by the call subscriber that a toll connection is desired, she will test the recording trunk multiple jacks until one is found that is free, when she will insert the calling plug of the pair of cords, used to answer the subscriber, into said jack. This will, first, complete a circuit from battery through the sleeve relay *D* in the local cord circuit to the ground on the sleeve of the recording jack, consequently operating this relay and lighting the supervisory lamp; and, second, raise the potential on the sleeve of this jack to the negative side of battery, thus placing a busy test on this line. At the same time a circuit will be established which may be traced as follows: From battery through the relay *D* over the sleeve strand of the cord and trunk, through relay *C* and hence by way of the tip strand of the trunk and cord through relay *E* to ground. Due to the very high resistance of relay *C* the local cord relay *E* will not operate, while the large number of turns of relay *C* will cause its energization, and consequently the attracting of its armature, which will close a circuit that may be traced as follows: From the ground on the make contact of relay *C* and its armature, to the armature of *B* and hence by way of the break contact of this relay through the line lamp and relay *"F"* to battery. Thus this lamp will light and attract the operator's attention, and she will therefore plug into the jack associated with this lamp. The act of plugging into the jack will close the make contact in the same, which will place the 200-ohm coil of relay *A* in parallel with that of relay *C*, thereby robbing the last named relay of most of its current, which will cause its armature to fall back, and furthermore, the closing of the circuit through relay *A* will allow enough current to flow through the coil of relay *E* in the local cord circuit to cause its energization, thereby extinguishing the local supervisory light and thus inform this operator that the call has been answered. Since the circuit through relay *A* has been closed it will be energized, thus causing the attraction of its armature, which will complete the following circuit: From the ground on the make contact of this relay to the break contact of relay *C*, through the coil of relay *B* and over the sleeve strand of the trunk and recording operator's cord to the retardation coil *G*, and hence to battery. Therefore, relay *B* will be energized, causing the attraction of its armature which will open the lamp circuit, and extinguish this light, and it will also lock relay *B*, which circuit may be traced as follows: From battery to the make contact of relay *B* through the coil of this relay to the break contact of relay *C* and hence to the make contact of relay *A* to ground. All the signals in the circuit have now been cleared, and the recording operator is ready to converse with the subscriber from whom she will obtain the regular data. Having obtained this information she will request him to "hang up." The act of hanging up his receiver will light the answering supervisory lamp in the local cord circuit, while the removal of the recording plug will open the contact in the jack, and hence open the shunt around relay *C*, which will cause its re-energization, and since relay *E* in the local cord circuit again finds itself in circuit with the high wound relay, the current fed to it will be insufficient to hold up its armature, the falling back of which will cause the calling supervisory lamp in the local cord to light. The recording lamp will not relight since relay *B* is still energized, thus retaining the open in this lamp circuit. The method in which relay *B* remains energized is as follows: When the recording operator removes her plug, as explained above, the armature of relay *A* falls back and relay *C* is immediately energized, thus shifting the ground connection from the break contact of relay *A* to the make contact of relay *C*, and since relay *B* is designed so as to be slow acting this shift is made before the make contact of relay *B* is broken, and hence this relay remains locked, due to the circuit that can be traced from the ground on the make contact of relay *C* through relay *B* and its make contact to battery. Now, as stated above, the supervisory lamps in the local cord circuits have been lighted, and consequently this operator will remove her plugs. This will open the circuit through relay *C*, causing the release of its armature, which will open the circuit through relay *B*, causing its armature to fall back and thus restore the apparatus to its normal condition.

THE TELEPHONELESS TOWN.

How could a progressive up-to-date American city get along without telephone service? We mean no telephone service of any kind. Think of it! Not a wire working, and the only way to transact business being by letter or messenger! The city of Butte, Montana, has had a taste of telephone famine, and doesn't like it. The Rocky Mountain Bell Company quarreled with its employes, who declared a strike, and tied up business almost entirely for a few days. This is the way the Butte Evening News wails about the hardships of no telephones:

"Butte is essentially a telephone town and it feels the shutdown keenly in consequence. Professional men, merchants and the newspapers are greatly inconvenienced, but almost every member of the general public feels it more or less.

"Does Johnny develop a cramp at 2 a. m. Run to the telephone and call a doctor. Does a burst of smoke from your basement window warn you that a blaze is about to break out? Ring up the fire department. Are you going to catch a train or are you expecting someone from the east or west, north or south? Call up the hack stand or the railroad office and get the time of arrival. Do you find yourself in need of groceries? Has the iceman overlooked you? Did the milkman leave sour milk? Do you think you will take a chance on Butte Copper, Davis-Daly or Amalgamated? What is the score? Did you get the right tip on the horse race? What the dickens was Amalgamated to-day? Mamie, are you going to the gardens to-night?

"All one had to do in the past when confronted with one of these perplexing problems was to seize the telephone and, presto, everything was cleared up. To be sure it was sometimes necessary to smother just a grain of impatience when Central would murmur sweetly, 'Line's busy,' or forget to answer you at all, but it was vastly superior to the present 'wireless' system of communication."

With the exceptions of water and light, there is no public necessity which the average city would miss so much as telephone service if deprived of the same. The proof of this assertion is found in the lament of Butte for loss of the Bell service which is notoriously poor in that section of the country.

The operators at the Topeka (Kansas) Independent Telephone Company's new exchange were literally "stuck on their jobs" recently when a lot of new stools were provided for the girls to sit upon at the switchboard. The damp weather during the week before the exchange was moved softened the varnish on these stools, with the result that when the girls attempted to get up after sitting still for a time they found that they could not—the varnish was holding their dresses to the stools. Great difficulty was experienced in prying some of the girls loose, and several pretty dresses were ruined by the varnish that adhered to them. The difficulty was solved by placing pieces of heavy cloth over the seats and backs of the stools to separate the girls' dresses from the varnish. The scheme worked all right, and the girls got lots of amusement out of jokes about the great comfort they obtained from sitting on cushions made of one thickness of cloth.

A SPECIAL WORD TO SUBSCRIBERS

In requesting change of address, always give the name of the post office to which your magazine is sent. Your name cannot be found on our books unless this is done. TELEPHONY is not returnable from the newsdealer. If you desire to purchase the paper from a dealer it will be to your advantage to notify him that you will want it, in order to insure his having a copy for you. If you wish to receive the paper regularly, please send in your subscription so that we can mail it to you direct.

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EDITORIAL DEPARTMENT

ASSOCIATION STAMPS.

THE International Independent Telephone Association has issued stamps bearing the Independent shield which will be placed on telephones and switchboard drops, and will recommend to its members as well as members of the various state associations, and Independent buyers generally to see that all equipment purchased bears the association stamp. Nearly all the telephone manufacturing companies have agreed to place these stamps upon all switchboards and telephones shipped. This arrangement will give the association a steady income from the stamps used and will insure Independent exchange buyers from any imposition from any manufacturing company not approved by the International association. In other words it will be impossible for any Bell owned manufacturing company to foist its apparatus upon buyers who are not familiar with the company's standing in the telephone field. It is expected that all loyal Independents will insist on the stamps being affixed to all apparatus purchased. The plan will not work a hardship to anyone and will prove beneficial to everybody interested in the Independent telephone field. Insist on the shield stamp.

OVER 10,000 CIRCULATION.

OF the first issue of TELEPHONY, which appeared January 1, 1901, there were printed and mailed more than six thousand copies, and the succeeding issues were given a circulation in excess of this number. On the front cover of the publication we have for the past six years, printed the words "Largest telephone circulation in the world." This statement we have always been willing to prove, but to our knowledge it has never been questioned. Being the oldest, largest and most influential journal in the telephone field, TELEPHONY's position has been so strong, that it has seemed unnecessary to give circulation figures. Most of the telephone and allied manufacturers believed that the publication was read and referred to by practically every buyer of importance in the Independent telephone field. Its publishers have certainly done every thing possible to place the journal in the hands of every telephone man of consequence in the world. But that there may be no doubt as to the circulation of TELEPHONY, we will furnish any one, upon request, a sworn statement signed by the publication's president and advertising manager and certified to by the printers. On the front cover of this issue we print the words "Sworn circulation of this issue over 10,000 copies." The affidavit proving this circulation will be mailed to all the large manufacturers and any others interested immediately after the edition is placed in the mails. The affidavit will state that there have been printed and mailed of the September issue of TELEPHONY an amount in excess of 10,000 copies. There will be no chance of misunderstanding. This journal's minimum circulation will be a known quantity. TELEPHONY is the first telephone publication to give its sworn circulation and in this as well as everything else pertaining to the industry TELEPHONY leads, as it has always led.

There are few trade papers with as large a circulation as the above and it is a tribute to the strength of the Independent movement for us to be in position to swear to a circulation exceeding 10,000 copies.

TELEPHONY'S POSITION.

OF all the journals and publications which claim to represent the Independent telephone movement and aid in its success, TELEPHONY is now the only one which does not accept advertising from the Kellogg Switchboard and Supply Company. The reason why this publication does not accept such advertisements is well known. Briefly stated, that reason is because TELEPHONY does not believe it either consistent in theory or genuine square-dealing in practice to condemn the Bell telephone monopoly in its reading pages and throw open its advertising section to a manufacturing company which is owned and controlled by the Bell, as is the Kellogg concern. In other words, TELEPHONY does not believe it fair to either side—Independent or Bell—to sell its advertising space to a buyer who could, with perfect propriety, use that advertising space to combat the very sentiments and policy advocated in the editorial pages.

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Readers of TELEPHONY will readily recall that this publication has repeatedly declared:

That the Kellogg Switchboard and Supply Company is a Bell ally, and, therefore, should not be patronized by Independent telephone men.

That Independent companies should deal with Independent manufacturers, thereby supporting their friends and avoiding the unwise policy of furnishing the enemy with money to fight the Independent cause.

That every Independent dollar paid to the Kellogg concern is sure to find its way into the treasury of the Bell monopoly, and just as sure to be used by the trust in attempting to stifle telephone competition.

Firmly believing this, TELEPHONY has preached this doctrine in and out of season. Holding these views this publication has not felt that it could conscientiously receive Kellogg advertising. It meant a financial sacrifice, of course, for the Bell monopoly—like most trusts—usually has the money to pay its bills, and the history of the Bell company shows that it has always been remarkably generous in paying for the printer's ink used in its behalf. The tremendous activity of the Bell press bureau—which has unmercifully pounded every Independent telephone enterprise launched in the country—is sufficient proof of that statement.

Nor are we particularly squeamish about "tainted money" as that which is dispensed by the monopoly might be called. The chances are that money paid for Kellogg advertising would go just as far in paying the expenses of a publishing business as the honest dollars received from a simon-pure Independent. However, the fact remains that TELEPHONY could not see its way clear to having dealings with the Kellogg concern while at the same time warning Independent operators against buying apparatus from the Bell-controlled factory.

It is, of course, gratifying that this stand has been indorsed by the International Independent Telephone Association, which at the annual convention in 1906 adopted a resolution, urging members to refrain from buying Kellogg equipment for the very good reason that the company is owned and controlled by the Bell. This action naturally strengthened the conviction that no Independent telephone journal should lend its columns to help a Bell concern secure Independent patronage when it was plain that such money would flow into the exchequer of the trust, there to be utilized in fighting. blocking and checkmating the Independent operating companies throughout the United States.

As recognized by the International convention, those Independent companies who installed Kellogg apparatus when the Kellogg itself was Independent, have been generally conceded the right to purchase additions and extensions from that concern, but it is apparent that as fast as possible such companies should free themselves from any connection with the Bell ally. Furthermore, should the Kellogg return to the control of Independent parties, as would be just, the ban would be lifted, and the company would be recognized and entitled to its share of Independent patronage. TELEPHONY has no personal grudge against the Kellogg. This publication accepted its advertising when it was an Independent concern, and would declare off all hostilities should the company revert to its former place in the Independent ranks. At present, however, consistency and square dealing impel us to follow the course that we have urged upon Independent men in the field—that is. have no dealing with the enemy. Having urged others to steer clear of the Kellogg it would seem not to be TELEPHONY'S part to help boost that company's claims to the support of the field. As stated before, this publication is the only one in the Independent telephone movement which adheres to this position. Furthermore, it is our belief that this stand will be approved by the field at large.

At the same time, TELEPHONY has no quarrel with other telephone journals who accept Kellogg advertisements. There are various degrees of loyalty to a cause, and each must be the sole judge of how far he himself shall go. In all wars there are those who are willing to deal with the other side—especially if it means financial profit to themselves. But that is neither here nor there. It may, however, explain why other Independent journals give a place to the Kellogg concern beside the Independent manufacturers who have helped to build up the anti-Bell movement.

The present year has furnished numerous examples of proof that the Independent telephone movement is pushing the Bell trust hard all over the country. Never before has the proud monopoly been so anxious to perfect working agreements, negotiate compromises and secure divisions of operating territory. In nearly every case the Independents have wisely rejected these overtures, on the principle that when the enemy is faltering and giving way it is no time to cease fighting and make terms. So with the Kellogg; it has been masquerading as an Independent concern and on that ground seeking Independent business. Perhaps, the fact that the Kellogg secures space in Independent journals has aided in that direction. If so, TELEPHONY is the more glad that it has declined to accept Kellogg advertising and give that Bell-controlled company the facility to compete with straight-out Independent manufacturers. The Independent manufacturers are entitled to Independent patronage. Their apparatus is as good as can be made, and they certainly have a valid claim on the men and companies with whom they have labored to make competition in the telephone field possible.

"The Independent field for Independents" should be the motto of those connected with this branch of the telephone industry.

AN IMPORTANT DECISION.

A COURT decision of great significance to telephone men has been rendered in New York state to the effect that a contract between a telephone company and a hotel proprietor, giving the company the exclusive right to operate in such hotel, is void. Justice W. S. Andrews of Syracuse held that such a contract was in restraint of trade and against public policy, and therefore nullified the contract existing between the Central New York (Bell) Telephone and Telegraph Company and the Yates Hotel.

The result of the case was a victory for the Independent movement in that section. The proprietor of the hotei attempted to install the system of the Syracuse Independent Telephone Company, although he had entered into an agreement with the Bell concern in 1902 to use only the latter's line. The Bell company resisted the effort of the hotel management also to patronize the Independents and secured an injunction to prevent the entrance of the competing company. About a year ago the lower courts decided in favor of the Bell and held that the hotel could not terminate the contract by giving thirty days' notice. The case was appealed and the court of appeals upheld the exclusive contract as valid. There was a re-argument, however, which has finally resulted in defeat for the monopoly.

In passing upon the case the higher court held that public welfare was the chief element to be considered. The point was made that the telephone company is at least a quasi-common carrier and the hotel is, in a sense, a public place. Justice Andrews ruled that while such an exclusive contract would not be questioned between individuals its existence in the circumstances noted is adverse to public interest. By the decision the injunction excluding the Independent company from the hotel is vacated.

A BIG FALL TRADE.

TELEPHONE manufacturers and operators are all of the opinion that this fall and winter will see the greatest activity ever known in the Independent field. The country is in a prosperous condition and outside of the fact that Wall street stocks are down there is nothing to indicate any let up in the building of telephone systems and lines. The only difficulty is that it is not possible to build fast enough to take care of the demand for telephone service. There are some who think the present slump in stocks will have some effect on business but an effectual stopper was clapped over the cries of the pessimistic prophets by a statistically argumentative interview recently given out, authorized by Leslie M. Shaw, former secretary of the treasury, now president of the Carnegie Trust Company, of New York. Regarding the present financial and industrial condition he said:

"Our farmers produce more than $6,500,000,000 per annum, and the prospect is good for an average crop. Our mines yield more than $1,500,000,000, and our forests more than $1,000,000,000. And neither of these sources of wealth has been exhausted. The output of our factories, in other than food products, is $12,000,000,000, and no fires have been extinguished. The railways earn more than $2,000,000,000, and they are all in successful operation. The pay rolls of our factories and railways aggregate approximately $3,500,000,000, and the scale of wages has not been reduced.

"In other words, the real sources of the people's wealth have not yet been affected, and the ability of industrial concerns to pay dividends is not measured by the market price of their stocks. Logical reasons for serious conditions are therefore wanting. Psychological reasons are never wanting.

"If I judge correctly, the people will have exactly what they expect. If those who have money in the banks withdraw it and lock it up; if the banks refuse to grant accommodations, and if the consuming public decline to place orders, then we will soon witness the effects. Let those who think that times of disaster follow each other at regular intervals bear in mind that this country never yet experienced a period of severe depression that was not traceable to financial or economic agitation or legislation, and usually to both.

"In 1893 the redemption of greenbacks in silver instead of gold was openly advocated; the party in power was under promise to remove the protective tariff from our industries, and the free coinage of silver at the ratio of sixteen to one was championed by prominent members of both parties. The country might have survived any one of these sources of alarm, but it could not survive all three. At this time no one questions our financial system, and the tariff will not be touched for at least eighteen months."

There is a demand for telephone service from all sections of the country and operators and manufacturers should make plans to take care of this demand and make the next six months record breakers.

OPPOSE CHICAGO TELEPHONE ORDINANCE.

THE Chicago (Bell) Telephone Company has been trying to secure from the city a renewal of its franchise under a new schedule of measured rates, which the company claimed would reduce the price of telephone service. There has been a great deal of protest and it is not likely the city fathers will grant a renewal to the company on the proposed plan, without some very material changes. TELEPHONY has received a number of letters in reference to the proposed ordinance; the following one from Mr. Ernest E. Yaxley, treasurer and general manager of the Monarch Telephone Manufacturing Company, points out one of the jokers in the ordinance:

EDITOR TELEPHONY:

"I beg to call your attention to the following paragraphs copied from the draft of the Chicago Telephone Company ordinance as recommended by the committee on gas, oil and electric light:"

> Four-party line (for private residences only) at a guarantee of five cents per day, including one message.
>
> Code ringing, so provided that not more than two bells shall sound at the same time, may continue on four-party lines until suitable appliances for selective ringing on such lines shall be available and reasonably practicable.

"Reduced residence telephone rates has been the strong argument used by the Chicago Telephone Company to interest the people of Chicago in securing its ordinance. By a careful study of the above paragraphs it will be seen that a most beautiful "gold brick" is being offered to the patrons of four-party telephone service. The people have been led to believe that the same selective four-party service that they are now getting will continue after the reduced rates have gone into affect, but it evidently is the intention of the Chicago Telephone Company to substitute code ringing on its four-party lines instead of selective ringing. The real object is apparently to provide a four-party service that is of but little practical use and thus drive the patrons to the ten-cent a day two-party service for relief which would leave the cost of residence telephone service the same as it is at the present time.

"The divided circuit as contemplated in the proposed ordinance is considered obsolete and impracticable for use in large cities by the Independents, and it's to be hoped when the ordinance comes before the city council that it will see that the people get what they have been promised. The writer is doing everything possible to have the following amendment made:"

> Selective ringing, so arranged that not more than one bell will sound at the same time, shall be provided for all party line service.

"This is a very important matter to the people of Chicago and anything that TELEPHONY can do toward securing the above amendment will be highly appreciated by the users of residence telephones."

ERNEST E. YAXLEY.

Mr. E. J. Baker, of the Farm Implement News, is another Chicagoan who opposes the ordinance. In a letter to TELEPHONY Mr. Baker says:

EDITOR TELEPHONY:

"Have you figured how the Chicago Telephone Company ordinance will affect your business? If you have I shall be glad to hear from you on the subject. For some time I have kept a careful record of outgoing calls and find that the average in this office is thirty per day. Counting some use of the telephone on holidays and occasionally on Sundays the total number of calls per year would be 9,600 to 9,800. Possibly the total would not exceed 9,500 or 2,375 for each quarter. Let us see what these would cost under the Chicago Telephone Company's measured rate ordinance:

The first 300 would cost five cents each....	$15.00
The next 600 would cost three cents each..	18.00
The remaining 1,475 would cost 2 cents each	29.50
Total	$62.50

"This would be the expense each three months, making a total of $250 for one year, or exactly double what is now paid for the unlimited service. Under the ordinance there is no way for a business house of ordinary size to secure adequate telephone service under $250 or more per year. An average of fifty outgoing calls for each day in the year will cost $432 per year.

The more one studies this ordinance the more outrageous it looks. The rate is not reduced materially to anyone unless it be a few of the very largest users. Under the

proposed ordinance all small users of the telephone will continue to pay five cents per message. Business houses of the smaller class will pay from five cents to four cents per message, according to the number sent, but large business concerns will pay a fraction over two cents per message. The largest houses that have unlimited trunk lines will be able to send messages for less than one cent each. This is stated in the company's recent advertisement. This rate is, of course, available only to the very largest users who can lease unlimited trunk lines. The cost of telephone service, to those now using unlimited service at $125 per year, will be increased from 25 per cent to 400 per cent. I have no interest in this ordinance other than this: I don't like to be robbed. Do you?"

E. J. BAKER.

In a later communication Mr. Baker goes into the matter at more length, and shows the proposed ordinance to be all in favor of the company. These three letters will give an idea of the general opinion of Chicago telephone users. Mr. Baker's letter follows:

"I wrote you recently about the Chicago Telephone Company ordinance. My friends and business acquaintances have shown so much interest in this matter that I am tempted to talk a little more on the same subject. In my previous letter I called your attention to the fact that the proposed ordinance does not materially reduce the rate to anyone, while it would bring about an enormous increase in the cost of telephone service to nearly every user of the present unlimited service. The small user must continue to pay five cents per message, while the largest establishments, with their unlimited trunk lines, would be able to secure telephone service at less than one cent per message. This is the company's own statement in its advertisement of June 2. The company has kindly consented to give the well-to-do man, who can afford to pay $56 per year, unlimited service at his residence as before. As house telephones are used every day in the year the subscriber to such a telephone by using fifteen messages per day average would have a rate of one cent per message.

"The question naturally arises, why should the man of moderate means at his house and the business establishment of the smaller class pay five cents per message while the well-to-do man at his house and the rich man at his large business establishment secure service as low as one cent per message?

"I believe the great mistake made in this telephone campaign is as follows: No effort has been made to secure a lower price to the smaller users of the telephone. A telephone message is not worth five cents in Chicago. This is proven by the fact that the Chicago Telephone Company is willing to handle messages at less than one cent each. There is too much difference between the small user and the largest users. If the company to protect its lines must have measured service for business houses it should certainly have measured service for residences. Unlimited residence telephones have from ten to twenty calls per day each. The cost is but little over one cent each and these messages average from two to three times the length of those sent out by business establishments. If a genuine reform is to be effected all unlimited residence service should be abolished and reasonable unlimited service should be continued for business establishments. Every well regulated business office confines its messages to those that are necessary and avoids long use of the line.

"The fact is that the Chicago Telephone Company is playing the large user of the telephone at business office and residence against the great class of medium users of business telephones; at the same time counting on the indifference of small residence subscribers who are to pay five cents per message under the proposed ordinance. If this outrageous ordinance is to be defeated every telephone user in the city should get busy. See your alderman or write them. If possible write all the aldermen in the city. Write to the mayor also. A plea should be made for a fair price to subscribers of all classes. If nothing is done for the small users of the telephone the company will probably be able to carry its point to the serious detriment of all business establishments except the largest.

E. J. BAKER.

OHIO'S DETERMINED STAND.

AS was to be expected, Ohio Independent telephone men took a decisive stand against any compromise with the Bell monopoly at the state meeting held at Columbus August 6. Not only did the state association go on record as being unalterably opposed to any scheme of combination or working agreement, as had been proposed by the Bell, but that body took steps to authorize the prosecution of such companies as may enter into such a compact for violation of the anti-trust law in force in Ohio.

The meeting was held at the Southern Hotel and was presided over by Frank L. Beam, of Mt. Vernon, president of the Ohio Independent Telephone Association. More than three hundred members were present. Prior to the rejection of Bell overtures the association listened to an address on "Why Is Independent Telephony Successful?" by Harry M. Dougherty. W. G. Thompson, of Hamilton; James B. Hoge, of Cleveland, and H. B. Folsom, of Circleville, discussed "Why Is Competition Desirable in the Telephone Business?" and A. Hess, of Sidney, spoke on the enforcement of general laws in Ohio with reference to the telephone business.

A resolution calculated to prevent any combination between Independent companies and the Bell, to carry out the latter's wishes regarding the elimination of competition, was then adopted. It was offered by Mr. Hess and follows:

"Whereas, It is the sense of the Independent telephone companies of Ohio, composing this association, that its members refuse to enter into any contracts or arrangements whereby competition is eliminated and that all violation of law arising from such arrangements or contracts will be prosecuted by this association,

"Resolved, That the executive committee is hereby authorized to take such steps as are necessary to carry this resolution into full effect."

The executive committee, under this resolution, may invoke the Valentine anti-trust law against any company which agrees with the Bell to stifle competition.

Later in the session, after the overtures of the Bell had been fully discussed, the following resolution was unanimously adopted:

"Whereas, Certain Independent telephone companies have violated their contracts with the United States Telephone Company by permitting unauthorized connections and interchange of business prohibited thereby, to the serious injury of every Independent telephone company in Ohio, or interchanging business therewith.

"And, Whereas, The maintenance of competition in long distance telephone business is deemed necessary for the best interests of the companies as well as the public,

"Therefore, Be it resolved by the Ohio Independent Telephone Association in convention assembled that we deem it the duty of the United States Telephone Company to enforce its contracts wherever violated, and, be it further resolved, that we demand that the United States Telephone Company bring suits, if necessary, against all companies violating their contracts with it and this association pledges its unqualified support to said company in the prosecution of such actions."

As in Indiana, the Bell company was eager to make long distance connections with the thriving Ohio Independent

companies in many cities, agreeing therefor to abandon its local exchanges. By placing the stamp of disapproval on such an alliance the Ohio association has undoubtedly executed a wise move.

CANADIANS REFUSE COMPROMISE.

IT MAY be unfair to the temperance ideas of the government officials of the province of Alberta, Canada, to say that they take their whisky straight, but events show that they allow no adulteration or dilution of their telephone affairs. For several months the Alberta government was negotiating with the Bell Telephone Company. The government wanted to buy out the Bell in that province, and run the telephone business on an anti-monopoly basis. The Bell people refused the proposition, but came back with a counter proposal whereby a division of territory was to be made, the Bell and the government to work in harmony, and without competition. According to the monopoly's scheme it was to take the south half of the province while the government occupied the north half. Anybody who takes a look at the map of Canada and notices that the southern part of Alberta is much more thickly populated than the northern section will see that the Bell—true to its traditions—was not injuring itself at all by proposing this division of territory. On the contrary, the Bell, as usual, wanted all the best of the bargain.

The Alberta government has rejected the Bell proposition. It intends to take its telephones "straight," without any taint of dallying with Bell affairs. From henceforth, it is said, there will be keen telephone competition in Alberta, and the chances are the Bell will regret that it didn't sell out in the first place. In any event the provincial officials have done wisely in declining the working agreement proffered by the Bell combination.

NEW YORK BELL IN GRIEF.

MORE grief is in store for the Bell in New York City. Not long ago the city officials charged with that duty evinced a decided disposition to grant a franchise to an Independent telephone company, and now a committee of the board of aldermen has reported in favor of an official investigation of the legal status of the monopoly. The New York Telephone Company claimed the right to continue to operate under the charter secured from the state, regardless of the life of its municipal franchise. The aldermen do not see things in that light exactly, and question the Bell's assumption of being above the municipal regulation.

In its report the committee on laws and legislation says on this point:

"From such information as your committee has been enabled to obtain, and from an examination of the law relating to the franchise under which the existing telephone companies claim the right to operate, your committee has reached the conclusion that the contention of the New York Telephone Company with respect to its right to operate wires in this city by virtue solely of its charter from the state, is at least of doubtful validity, and that in dealing with the said company the utmost care should be observed to avoid the danger of confirming said company in the exercise of privileges of questionable legality.

"With reference to the claim of the New York company of its right to operate under the privileges acquired from the Metropolitan Telephone and Telegraph Company, because of the incomplete and indefinite information which has come to the knowledge of your committee relative to the manner in which such privileges were acquired, your committee is unable to determine as to their validity."

The pretense of the New York monopoly of giving concessions in the way of reduced rates, in order to stem the tide of public resentment and postpone the granting of a competitive franchise, is also punctured by the committee which also indirectly bears testimony to the efficiency of competition. In this connection the committee report says: "The committee finds that the reduction of rates at pay stations promulgated by the company has not generally benefited the public. Such reduction has affected only the limited number of such stations. The situation in this respect has not met public expectation, justified by the assurance of the company. Your committee appreciates that complaint as to the present telephone service may be in some instances exaggerated and that also the difficulties attending such service in a large city are not easily overcome, but the committee is satisfied that there is some just ground for complaint, and that service open to such fair criticism is the natural outgrowth of an unrestricted and uncontrolled monopoly of the business."

"Natural outgrowth of an unrestricted and uncontrolled monopoly" comes pretty near telling the whole story. Restrict the monopoly, as well as regulate it—that is, throw open the doors to Independent competition—and telephone service will improve. Experience in other cities has proved it, and New York should try the remedy.

INDEPENDENTS SURROUNDING CINCINNATI.

STEADILY and surely Independent telephone lines are weaving a net about Cincinnati where the Bell still holds a monopoly, and every new extension in that vicinity makes more certain the fact that it is only a question of time when competition will exist in that city. After six trials an Independent company has succeeded in gaining a twenty-five-year franchise at Middletown, Butler county, on the threshold of Cincinnati. The Middletown company will give connection with the Hamilton Home (Independent) Company to all points in the two counties. The new company was incorporated by Walter S. Harlan, Dr. D. B. Bundy, L. T. Palmer and Allen Andrews.

An idea of the sentiment in that section of Ohio about the victory of the Independents and the folly of Cincinnati business men in permitting the Bell to block competition in that city may be gained from the following extract from an editorial in the Hamilton Sun:

"Let the Middletown doubters look back over the history of the past. They have had one telephone. It was a Bell monopoly. They had poor facilities as the company didn't have to provide anything better for years. Objections and complaints fell on deaf ears. What was the use? The Independent telephone people got into Hamilton. They covered Butler county with one of the best telephone systems in the country. They made connections with practically the entire country except Middletown and Cincinnati. The loss was more to Middletown than it was to Hamilton. We think that the continued barring of the Independent telephone people from Cincinnati is more of a loss to the people of Cincinnati than it is to Hamilton. It would be to the mutual advantage of the two municipalities to have unrestricted telephone communication. It would aid the merchants—the business men—of both cities. That is true as to Middletown also. And Middletown will find it out. The added facilities of communication will be an immense advantage to everyone—to every business house and to every corporation, save and except the Bell telephone company. Middletown did something for herself when she gave the Bell telephone monopoly competition and opened up the wires to the Independents and, by the same stroke, to the people of the county and the state—always excepting 'Darkest Cincinnati.' And Middletown will soon realize what an advantage she has gained."

With Independent telephone lines at their very doors, it is believed Cincinnati business men will soon awake to the advantage of providing the connecting link between themselves and the vast network of Ohio Independent lines.

THE BELL MEMORIAL

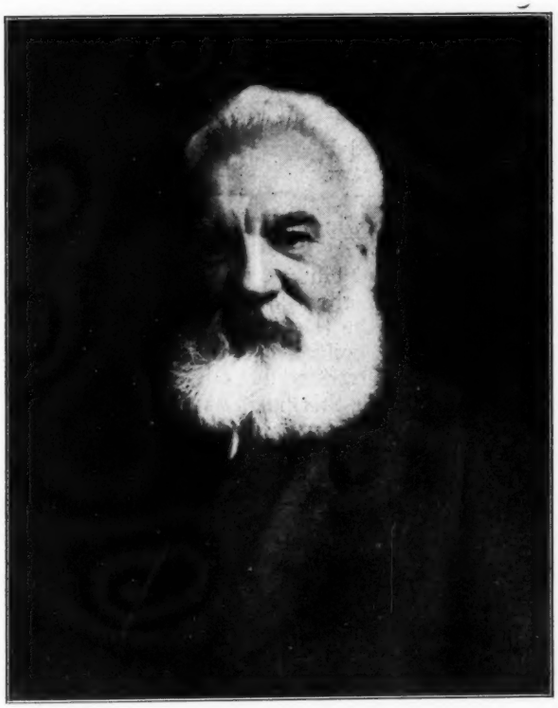
A Subscription being raised in Canada to erect a Monument to Alexander Graham Bell

By J. D. Wrenn

THE BELL MEMORIAL.

THE subscription list for the memorial to Professor Alexander Graham Bell is steadily growing, and it is expected that eventually $30,000 will be raised. Although Professor Bell, who was 60 years old last March, is still alive, it is proposed to erect a monument in his honor at Brantford, Canada, where he conducted his early telephone experiments. If the funds are sufficient the old Bell homestead, which lies just outside the city limits of Brantford, will be acquired. Professor Bell is still an active man and recently returned from a European trip. His home is in Washington, D. C.

Professor Bell's grandfather, Alexander Bell, was a student of sound waves and a noted orator and expert in elocution and voice culture. The inventor's father, Alexander



Alexander Graham Bell.

Melville Bell, was also a professor in vocal physiology, first in Edinburgh, then in London and finally in Canada. He offered a prize to his sons who would invent a talking machine, and Alexander Graham won by producing a device that would cry like an infant and say "Mamma." The promise thus early developed was realized by Bell, who later was granted the patent that made him recognized as the inventor of the telephone. Bell had no scientific knowledge of electricity, and has been wont to say that no electrician could have invented the telephone.

In casually referring to Professor Bell's early connection with the telephone it is interesting to note that as long ago as 1878 he foresaw with remarkable clearness the steps in advance that were to be made in the development of the invention. The central exchange, the underground and overhead cable, the intercommunicating house system, and other features which have come into use in recent years were predicted in a letter written by Professor Bell in 1878 to the men who promoted the first telephone company. This letter so prophetically outlined what has come to pass in the last 29 years that it is worth reading. It follows:

Kensington, March 25, 1878.

To the capitalists of the Electric Telephone Company:

Gentlemen—It has been suggested that at this, our first meeting, I should lay before you a few ideas, concerning the future of the electric telephone, together with any suggestions that occur to me in regard to the best mode of introducing the instrument to the public.

The telephone may be briefly described as an electrical contrivance for reproducing, in distant places, the tones and articulations of a speaker's voice, so that conversation can be carried on by word of mouth between persons in different rooms, in different streets, or in different towns.

The great advantage it possesses over every other form of electrical apparatus consists in the fact that it requires no skill to operate the instrument. All other telegraphic machines produce signals which require to be translated by experts, and such instruments are therefore extremely limited in their application, but the telephone actually speaks, and for this reason it can be utilized for nearly every purpose for which speech is employed.

At the present time we have a perfect network of gas pipes and water pipes throughout our large cities. We have main pipes laid under the streets communicating by side pipes with the various dwellings, enabling the members to draw their supplies of gas and water from a common source.

In a similar manner it is conceivable that cables of telephone wires could be laid under ground, or suspended overhead, communicating by branch wires with private dwellings, country houses, shops, manufactories, etc., uniting them through the main cable with a central office where the wire could be connected as desired, establishing direct communication between any two places in the city. Such a plan as this, though impracticable at the present moment, will, I firmly believe, be the outcome of the introduction of the telephone to the public. Not only so, but I believe in the future wires will unite the head offices of telephone companies in different cities, and a man in one part of the country may communicate by word of mouth with another in a distant place.

In regard to other present uses for the telephone, the instrument can be supplied so cheaply as to compete on favorable terms with speaking tubes, bells and annunciators, as a means of communication between different parts of the house. This seems to be a very favorable application of the telephone, not only on account of the large number of telephones that would be wanted, but because it would lead eventually to the plan of intercommunication referred to above. I would therefore recommend that special arrangements be made for the introduction of the telephone into hotels and private buildings in place of the speaking tubes and annunciators, at present employed. Telephones sold for this purpose could be stamped or numbered in such a way as to distinguish them from those employed for business purposes, and an agreement could be signed by the purchaser that the telephones should become forfeited to the company if used for other purposes than those specified in the agreement.

It is probable that such a use of the telephone would speedily become popular, and that as the public became accustomed to the telephone in their houses they would recognize the advantage of a system of intercommunication.

In conclusion, I would say that it seems to me that the telephone should immediately be brought prominently before the public, as a means of communication between bankers, merchants, manufacturers, wholesale and retail dealers, dock companies, water companies, police offices, fire stations, newspaper offices, hospitals and public buildings and for use in railway offices, in mines and other operations.

Although there is a great field for the telephone in the immediate present, I believe there is still greater in the future.

By bearing in mind the great object to be ultimately achieved, I believe that the telephone company cannot only secure for itself a business of the most remunerative kind, but also benefit the public in a way that has never been previously attempted.

I am, gentlemen, your obedient servant,

ALEXANDER GRAHAM BELL.

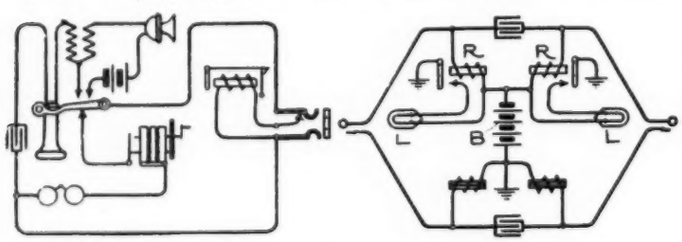
QUESTIONS AND ANSWERS

By H. P. Clausen

SOME months ago we discussed the question of the effects which might be observed in case the negative terminal of a storage battery is connected to earth instead of the positive terminal. The suggestion was made at the time that when a common battery exchange is so installed that the negative side of the storage battery is connected permanently to earth, electrolytic troubles may be looked for. These troubles may not show immediately after the installation of the plant. It may even take years before the faults caused by electrolysis begin to show in the direction of the relay coil windings opening up, and even bridle wires on the outside mysteriously opening up. This, of course, is an effect which one can surely expect to occur with the battery connections as explained.

While the original discussion on this subject invited suggestions from our readers, no communications have been received, which either indicates that no one is having any trouble through the effects of electrolysis or that the importance of the subject has been underestimated. Personally, the writer knows of cases where the effects of electrolysis began to develop something like four years after the original installation of the plant, and in an exchange having approximately 1,000 lines installed, as many as fifty relay coils were found to open up per day, and as evidence tending to show the real cause of the difficulty, it was found that by connecting the positive side of the storage battery to ground, the coils continued to open up about three or four days after the change, gradually decreasing to one or two coils per day, and finally ceasing altogether. The writer will be glad to hear from any of TELEPHONY'S readers who have experienced troubles of this kind, as a discussion of this problem will surely result in great benefit to all who have anything to do with the operation of a common battery exchange.

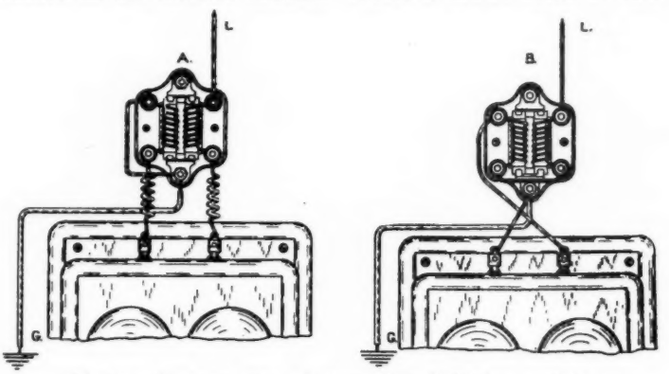
Referring to drawings shown herewith, kindly advise how I can arrange to use this cord circuit in connection with farm lines. That is, in putting up a connection from one grounded farm line to another grounded line can any provisions be made for obtaining a clearing-out signal when two grounded farm lines are connected together? Kindly explain as fully as possible.—J. F. L. C., Texas.



An Automatic Supervisory System.

It will be observed that two grounded telephone circuits can be connected together and operate the supervisory system shown in the drawing, for the operation of the supervisory does not depend on using a metallic return wire. For a farm line, however, it would be impossible to operate the supervision unless but one instrument were connected to each line. Of course, more instruments may be connected to the line, but it would call for connecting them all in series, which naturally is not a very good plan. My article in the July TELEPHONY explains what system would be the best to adopt in cases where there is more than one instrument on a line.

I do not quite understand the method of wiring for a grounded circuit given by the manufacturer of the lightning arrester described on the enclosed circular. Would it not be better to compell the line circuit to pass through both coils before entering the telephone? Or is the method outlined better and why?—B. J. R., Minn.



Right and wrong way of connecting lightning arresters.

The diagram which you enclose shows the general connections of a well known protector. *A* shows the method which has been adopted by the manufacturer for connecting up the arrester between a single wire telephone line and telephone instrument. The wire *L*, it will be observed, passes through a wire winding having some inductance or, what is ordinarily termed, impedance. The wire then continues to the right hand binding post on the telephone, and after passing through the instrument windings, the left hand binding post of the telephone is connected to a terminal of the remaining coil on the arrester. This coil also is wound so as to introduce impedance and connects to earth, as shown. With this particular arrangement it will be observed that a discharge of lightning will pass from the line wire to the ground plate, and there is little likelihood of the current arcing across to the remaining coil on the arrester and thus resulting in a possible burn-out of the telephone.

This is a method which has been recommended by the manufacturers. Diagram *B* shows the method suggested by the correspondent and it will be observed that should the lightning through any chance jump across from one coil to another, it would result in burning out the telephone instrument owing to one side of the telephone being permanently grounded. Therefore, the method shown by *A* is recommended as the better one to adopt.

Do you know if there are any tuned bells or different sounding ones made for use on extension bells for switchboards? It is very difficult to tell which line the rings come in on where a number of bells are on the same board. Please answer in TELEPHONY query columns.—C. L., Ontario, Canada.

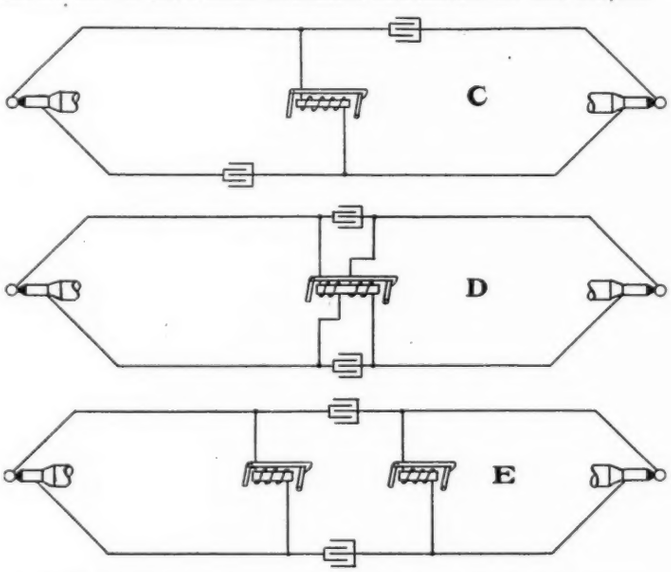
In the manufacturing of tuned bells it is the usual practice to make the gongs up in different shapes so as to obtain the different rates of vibration. Unless considerable space is available in the front of a switchboard, it would be practically impossible to take advantage of the different tones which might be obtained through the use of differently shaped gongs. The best practice is to provide the bell tapper with a projection which will cause an indicating shutter to fall whenever a call comes in over the line. Of course it calls for the replacing of the shutter, but at the same time it does provide a practical means for permitting

an operator to know over which line a call has come in. These shutter arrangements may be obtained by communicating with advertisers in TELEPHONY.

In the "Questions and Answers" of your August issue you mention a telephone line with a poor ground and ask whether a remedy can be suggested for such. Allow the writer to inform you of a plan which worked perfectly for eight years through very poor land. We simply drove a ¾-inch galvanized iron pipe into the ground through a cesspool such as is found in the country, and as I mentioned before, the plan worked perfectly well, for this grounded line, and as far as I know, still exists and helps to relieve the service on the new metallic circuit line.—J. C., Canada.

It appears as though the plan of our correspondent is worthy of serious consideration. There is no question but that there must be a core of moisture of an acid character extending from the surface of the cesspool to permanently damp earth, and it is this core which should produce a fairly good electrical circuit. Let us have some more suggestions of this kind and we shall soon be able to hedge in this question of producing a satisfactory ground connection in districts where the moisture lies seventy-five feet or more below the surface of the earth.

In recent issues of TELEPHONY I have observed that different types of clearing-out drop connections have been discussed. I should like to have some additional information on this subject.



Different methods of connecting clearing out drops to cord circuit.

Referring to Figures C, D and E, which is the best method to adopt for general practice, should the plan C not give good service? The plan D, of course, calls for double wound clearing-out drops, and the plan E for duplicate clearing out drops. Kindly give your advice on this subject.—C. K., Nebraska.

The plan which you show at *C* is one which has been adopted by a manufacturer with success. Local conditions may, however, require to be studied before the installation of this circuit. It is possible that with the ringers of the telephone grounded, inductive noises may be had through an unbalancing of the circuit, although this question has not been carefully investigated nor touched upon.

The plan which you show at *D* is, of course, one which has been adopted with considerable success. It is a practical method and as shown, it calls for a double winding on the clearing-out drop coil. The plan shown by *E*, while it will operate successfully, calls for the provision of duplicate clearing-out drops and for general all around work is not to be recommended unless the clearing-out drop is made up in the form of two coils with one common armature and shutter so that should either coil be energized it will result in dropping the same shutter.

In "Questions and Answers" in the August TELEPHONY, on page 84, concerning the line which passes through a very dry country where it is difficult to produce a good ground connection, I would handle the problem as follows: Assuming that the entire line is not in the dry section and only a part of the district is affected, I would run another line parallel to the present line as a metallic circuit from the nearest good ground to the telephones affected by a poor ground. I would not like to cut the system into a series system, for if anything is the matter with one telephone the entire line "goes dead." It might be best and cheapest to come in from both ends of the line, or to run a branch to one side a short distance. Whatever is done, do it well, then it will last and be cheapest in the long run.

I would be pleased to hear what they actually have done to meet the problem and also have a diagram of the line, giving distances between stations, conditions, etc.—F. W. S., New York.

The foregoing suggestion regarding a recent inquiry appearing in these columns is to the effect of registering an objection to the use of a series telephone circuit, and the correspondent, it will be observed, calls for further information regarding the actual circuit conditions, distance between instruments, location of good grounds, etc. If the original correspondent can give us information on this subject, it will be received and published with pleasure.

Regarding the suggestions made by F. W. S., he states that should anything go wrong with one of the telephone stations, the entire circuit would be put out of commission. This, of course, is a point well taken, but the question is, what plan can be adopted when we cannot obtain a ground connection at the different stations without going seventy-five feet into the earth? The bridging plan, at least for the signaling service, cannot be adopted. The series plan does provide a means for signaling.

A discussion of this subject will be of considerable interest and it is recommended that those who have met problems of this kind communicate the plans which they have adopted for meeting such difficult propositions.

NORTH CAROLINA INDEPENDENTS MEET.

The Independent Telephone Association of North Carolina held its second annual meeting at Salisbury, N. C., July 25. The convention was most successful and was permeated with a loyal spirit that augurs well for the future. A resolution was adopted urging Independents not to use apparatus made by the Kellogg Switchboard & Supply Company so long as that concern is controlled by the Bell. Another resolution, proving the stalwart character of North Carolina Independent telephone men was adopted condemning any connection with companies belonging to the Bell combination. This resolution follows:

"Whereas, The Bell Telephone Company is insidiously proposing long distance connection to local Independent telephone companies in various parts of the United States and offering in consideration of entering into such connections to abandon the local field; and

"Whereas, It is the sense of this convention that any such connection is bound to injure the Independent telephone cause as a whole; therefore be it

"Resolved, That this association frowns upon and denounces any affiliation or connection of Independent telephone companies with the Bell company anywhere on the American continent as being injurious to the people as a whole."

The principal topic discussed by the convention was the building of Independent long distance toll lines. The old officers were re-elected, William A. Wynne of Raleigh as president and Bernard W. Leavitt of Southern Pines as secretary.

At Janesville, Wisconsin, honey bees, which had swarmed inside a cable box of the local telephone company, attacked linemen at work and stung many other persons when disturbed. Several quarts of honey was removed from the box.

PUPIN MODE OF WORKING TRUNK TELEPHONE LINES

A Paper read before Section G of the British Association at Leicester, August 5, 1907.

By Sir William Preece, K. C. B., F. R. S.

IN 1896 I read a paper before Section A at Liverpool on "Electric Disturbances in Submarine Cables," in which I dealt with the subject of long-distance speaking by telephone. I pointed out that disturbances were due to energy being in the wrong place. An alternating current wave, set up in a telephone transmitter by a complete sonorous vibration impressed on the diaphragm, flowing for the period *a g*, Figure 1, if its voltage were indicated by *a b* when positive and by *d e* when negative, would possess in one received wave an energy proportional to the area bounded by *a b c e f g*, if it were wholly utilized, but would only describe the area *a a' d d' g* if the unshaded portion of the figure were proportional to the energy radiated or leaked away, absorbed as a charge, or dissipated as heat. The attenuated current thus indicated shows what radiation, leakage, capacity, hysteresis and resistance may do to absorb energy and deteriorate the clearness and loudness of speech as well as limit the distance to which ordinary speaking is practical. I had previously, in 1887, pointed out that the product of the capacity (K) and the resistance (R) gave a law which approximately indicated the distance to which speech was possible on telephone circuits. It accurately indicates the distance on single-wire submarine cables. In 1890 I read a paper giving the calculations on which the London-Paris telephone line, with its cross-channel cable, was designed and constructed in association with the French engineers. In 1892 it was determined to establish trunk telephone wires between the great commercial centers of Great Britain. All the calculations were based on the KR law. It is quite certain that this law is not absolutely true, for it neglects the factor of self-induction. The KR law is properly of the order KR/L, but experience has shown that inductance on short metallic

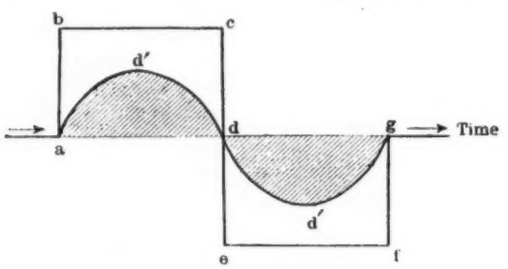


Figure 1.

loops is so small compared with capacity that it may be neglected. Mutual induction between the two wires compensates to some extent the self-induction in each wire. In long underground cables and long aerial wires, however, the influence of inductance becomes evident as the length of lines increase. On the other hand, capacity also increases owing to the variation of the mutual (wire to wire) capacity and the capacity of each wire to earth, which becomes an important factor with concentric cables or with any departure from symmetry. This is why "Hughes' twist" is so valuable and so superior to the "Cross" system so general in America. It not only completely prevents "cross-talk," but it secures a constant capacity with earth.

It is known that the effect of this electromagnetic induction is beneficial in one sense, as I pointed out in 1896, and it has been made more beneficial in another sense by Prof. Pupin (1899), who has shown how we can reduce the weight of copper used on trunk lines and also how we can extend the distance to which ordinary speech is practical.

Pupin's system is not so much the neutralization of the effects of electrostatic capacity by those of electromagnetic induction as a system of hastening the discharge of pent-up energy without additional loss by breaking it up into many successive steps. In a long submarine cable discharge is a slow process and all in one operation. The KR is great and the frequency small. In a "loaded" line the discharge is much more rapid, for it is performed simultaneously in several successive stages, of much shorter length and with much less waste or distortion.

The factors of energy E and Q are pent up by capacity and inductance. Energy is wasted by resistance, leakage, induction, radiation, reflection and interference. This waste of energy means diminution of amplitude, attenuation of wave volume, and loss of speech, while electromagnetic induction improperly placed means distortion of wave form, external disturbances and loss of articulation.

The factors that are involved in the problem of long-distance speech are so numerous and so diverse that all attempts to solve them by mathematics, except on very general grounds, have proved fruitless and only approximately true. It has been only by practical experiment that success has been attained. The defect in the mathematical investigation of the problem appears to be the neglect of the prime and principal factor, energy, and the assumption that there is in nature something analogous to negative energy. Energy, like matter, is always positive and it cannot be annihilated by a negative sign. But mathematical reasoning undoubtedly guided Prof. Pupin in going as far as he has. Our president, Prof. Silvanus Thompson, took out a patent on December 21, 1891, No. 22,304, where he very carefully considered the subject and very nearly anticipated Pupin.

The establishment of the telephone trunk system in Great Britain in 1896 showed the practical value of the KR law in determining the construction of an aerial system. The weight of copper used in the main trunk lines has been criticized, but the only fault committed was that I did not specify enough. Paris can speak with Liverpool, Manchester and Hull, but it cannot do so commercially with Glasgow and Edinburgh. London can speak with Aberdeen, Inverness and Dublin, but not with Cork. Pupin coils have not been applied permanently to the Post Office trunk lines, but careful experiments have been made to feel the way to do so and thus perhaps extend the range of Paris talks in Great Britain.

I designed a new form of cable and described it in my paper read before Section A in Liverpool in 1896, but no one has as yet ventured to test its merits.

A cable, designed by Mr. Willoughby Smith, of four wires symmetrically twisted on the inside of a gutta-percha tube so as to leave an air space, failed telephonically from imperfect symmetry. It was laid across the Irish Channel, from Nevin to Newcastle. Concentric underground gutta-

percha covered cables were laid in 1895 from the General Post Office to Nine Elms, and failed also from want of symmetry in the capacities between the conductors and earth. A magnificent underground trunk line for telegraphic purposes was commenced between London and Birmingham in 1897, but it was not completed while I was in office (I retired in 1899), and owing to its success it has now been extended, or is being extended, to Manchester, Liverpool, Leeds and Glasgow in the north, and to Plymouth and Dover in the south.

In 1899 Pupin proposed his coils, and by the enterprise of the American Bell Telephone Company and its allies great progress has been made in the states in developing the system. Many very valuable experiments have also been carried out in Great Britain by the Post Office and by the National Telephone Company. It speaks well for the technical spirit of the age that splendidly equipped experimental laboratories have been established in London at the General Post Office, National Telephone Company's central station, the Eastern Telegraph Company's headquarters, Electra House, and in New York and Boston, in America, by the American Bell Telephone Company. Very satisfactory advances have been made in Great Britain, and excellent reports of progress have been published by the Institution of Electrical Engineers in London. An admirable paper on "Telephonic Transmission Measurements," by B. S. Cohen and G. M. Shepherd, was read before this institution on May 9 last, which elicited an excellent discussion.

I purpose to report the results of a careful inspection I made in New York in April last, of the very successful work done in this direction by the New York Telephone Company, under the able direction of their chief engineer, Mr. John Carty.

The factors that enter into the problem of trunk wire working are very numerous and complicated. They are physical, commercial and personal. It is, as I have said, not a question of mathematics, but of experiment.

What are the factors in long-distance speaking, in addition to the ordinary elements of electrical energy, viz., electromotive force, resistance, capacity, inductance, current and time?

1. Eddy-current heat losses in diaphragms.
2. Hysteresis in coils, cores and circuits.
3. Change of wave shape due to storage and waste of energy in other forms.
4. Attenuation of waves due to dissipation of energy and its absorption.
5. Loss of the higher notes called "harmonics."
6. Reflection of waves from breaks and alterations in circuits.
7. Reduction of efficiency due to leakage, polarization, radiation and induction to neighboring bodies.
8. The reactions and interferences of neighboring circuits.
9. The constant change of every condition of circuit elements by switching through to different towns and subscribers.
10. The variable formation of the human mouth, tongue and teeth of different users.
11. Defects of articulation and want of experience in handling the apparatus by the users.
12. The inefficiency of hearing and interpretation of the listener and the absence of silence about him.
13. The absence of telephonic education in both speaker and listener.

The remedies are self-education, selection of proper apparatus, symmetry of circuits, the proper distribution of the controlling-factors, the restoration of stored-up energy, the alliance and mutual forbearance of users and suppliers.

It is clear from this incomplete enumeration of the factors involved that the problem of the reproduction of clear speech at a variable distance is a very complicated one. It has been solved by very patient plodding, by incessant experiment, and by judicious compromise.

The KR law as applied to submarine cables is very useful for calculating the speed of working, but inasmuch as trunk telephone circuits are aerial and telephonic currents alternating and very variable in form, self and mutual induction must play an important part in their propagation. It was found, however, by experiment that metallic circuits of copper wire suspended in air and constant in character were actually benefited by self-induction.

Hence in designing the trunk system of the Post Office in 1891 inductance* was neglected.

Ever since Faraday in 1853, while I was assisting him in his experiments, detected two waves in the underground conductors between London and Liverpool, I have regarded the propagation of intermittent electric currents, whether alternating or direct, in ordinary insulated conductors to be in the form of waves.

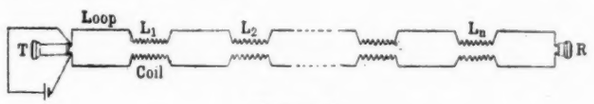


Figure 2.

Cromwell Varley in 1870 made an artificial cable equivalent to one of 12,000 miles long, and showed in evidence ten distinct currents in it flowing at the same time. I experimented in 1876 at the Silvertown Works on an artificial cable constructed for Mr. Stearn to duplex the Atlantic cable, and obtained evidence of several distinct waves present at the same time with beautiful effects of interference in duplex working. These were waves of energy in its electric form propagated with comparatively slow and variable velocity.

Hertzian waves developed in 1887 are disturbances of the ether of very high frequency, of the order of millions per second, having the velocity of light, viz., 186,000 miles per second. Telephonic oscillations in insulated copper conductors are of the order of hundreds per second, having a variable velocity of the order of a 1,000 miles per second. The length of a telephonic wave may be from 1 to 100 miles, but that of a Hertzian one may be from 1 foot to 10,000 feet.

Prof. Pupin in 1900 and Duddell in 1903 established the existence of these waves in telephonic circuits and measured their lengths, their form and their damping.

Between the voice of the sender at one end and the sensation of hearing at the other end the energy passes through several forms, acoustic, thermic, electric, magnetic, kinetic and potential.

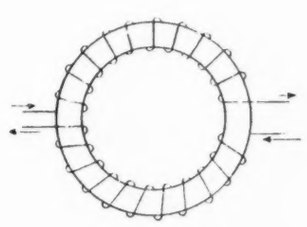


Figure 3.

The relations of these changes are very varied and complicated. The elements of energy in its electric form are coulombs (Q) and volts (E). Currents are coulombs per second. Thus time is an essential element and the frequency of waves and therefore their length is a dominant factor in the solution of the question. When electrical energy is transmitted by an insulated metallic circuit like

*Inductance is the coefficient of mutual and self-induction. It is indicated by M or L and is really a length measured in centimeters.

a telephone line we must first consider the capacity (K), resistance (R) and inductance (L) of the circuit.

The capacity (K) depends on its form, its length, the dielectric coating and the surrounding medium.

The resistance (R) depends on the metal used, its form and its mass. Copper is universally used for telephonic transmission.

The influence of inductance (L) depends on the electro-magnetic conditions present in the field, on the form of conductor, and on the direction and rate of change of the currents.

The capacity absorbs energy. It holds up a certain portion of the quantity of the charge tending to attenuate the current but ready to restore it in reaction. The insulating medium gets warm by hysteresis.

The resistance which has to be overcome absorbs a portion of the energy which takes the form of heat and is lost.

The Pupin coil stores up another portion of the energy which, like a spring under pressure, is ready to react on the release of the forced condition and is restored. The frequency, within the region of ordinary speech, which may be said to have from 200 to 2,000 sonorous vibrations per second, is not changed, but as distance increases the fine harmonics which give the individual quality or timbre of voice disappear and only the low fundamental tones remain. Thus the length of a circuit allowing a practical talk is limited by the amount of capacity and resistance present. It is increased by the presence of induction when this induction is put in the right place and is of the right character and amount. It is aided by the human ear, which has a magical gift for interpreting into speech what appear to be the merest phantoms of sonorous vibrations.

The diagram (Figure 2) illustrates a complete telephone circuit with its Pupin coils. It is one of a pair of twin copper lines of No. 14B, and S.G., weighing 65 pounds per mile, twisted about each other and insulated with dry paper, having a resistance of 13.7 ohms and a capacity of 0.065 microfarads per mile. Each coil has a pure soft iron ring core 3 inches in diameter, made of fine varnished wires to

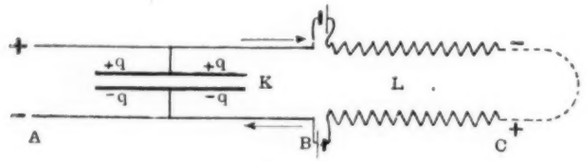


Figure 4.

reduce hysteresis to the lowest possible point, and is wound with two wires which are connected as shown in Figure 3. Mutual induction is thus eliminated and self-induction alone is active.

It has an inductance of 0.252 henry. Such an underground cable with 112 pairs of wires (loaded) has been laid between New York and Philadelphia, ninety miles long. Nineteen of these pairs are of No. 16 B. and S.G. for a short distance. The Pupin coils have been fixed at every one and one-quarter miles, and it works with a commercial efficiency which Mr. Carty calls a "fourteen-mile talk." The standard of comparison is a mean circuit of ten miles of No. 19 (1 mm.) copper wire in the City of New York, which is called the "ten-mile talk standard."

Each individual section can be shown diagrammatically, thus: Figure 4.

The straight lines indicate the two wires of the loop, the wavy line the inserted coil. The capacity of the loop is shown as a condenser and the electro-motive force of the coil as a battery cell. In the diagram they are shown separate, but in activity they act together to maintain the flow of energy and retain the form of wave. *ABC* represents time. It does not represent length of space or distance. *AB* and *BC* must be in tune.

In Figure 5 (1) is the rise of the wave when energy is absorbed and held up.

(2) is the decay of the wave when energy is restored.

Thus in each section energy is held up as the wave is rising and given out again slightly impaired by hysteresis but reinforced by induction when the wave is falling. It

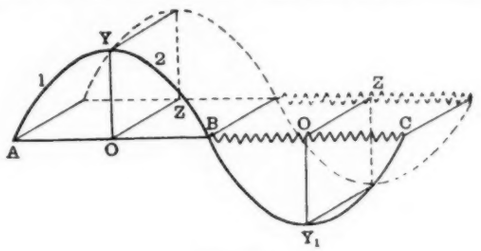


Figure 5.

is evident, from the clearness of speech, that the sum of all these actions results in a continuous flow of alternations without change of frequency when the limiting distance is not exceeded. When this limit is reached the waves are so attenuated that speech becomes impossible.

On the other hand, it must be pointed out that although capacity is greater than inductance in its influence on the current waves, they neither absorb energy permanently. They only hold it up for a time. They drag out or prolong the currents. Energy can be absorbed or it can change its form, but it cannot be destroyed. This is the doctrine of the conservation of energy.

Resistance, radiation and leakage do absorb energy and dissipate it wastefully. Our first object is to prevent waste of energy, and our second object to direct the pent-up energy into a proper channel to maintain the amplitude and form of the waves. This is what Pupin has done.

If we represent the action in a Pupin section by Figure 5, where *AB* represents the metallic loop and *BC* the double coil, *AC* being equal to one period of one short fundamental wave, then *OY* will represent the maximum positive electro-motive force acting during the period *AB*, and OY_1 that acting in the coil during the same period. *oz* represents the quantity of electricity (Q) flowing during the period; Q is assumed constant. It is a state of strain in the medium between the wires. A solid figure described by Q and E (the variable electro-motive force) would represent the energy propagated, except the minute losses in the section, which are inherent to the conditions of the circuit. These losses multiplied eventually absorb all the energy and the limit of speech is reached. The influence of the coils is clearly a time influence. It is a case of tuning. They break up a circuit into a series of sections in which the energy flows in virtually simultaneous steps instead of being prolonged and damped down as it would be in a long submarine cable. The frequency remains unaffected. It is clear that in each wave-length there are four distinctly marked points, *a*, *a'*, *d*, *d'*, where changes of phase affect the distribution of energy and its factors. It is as though Q remained for an instant in *AB* and E in *BC*. They then change partners with an action that continues the forward movement, but with a slight loss due to waste.

I regard the action as somewhat analogous to the transmission of mechanical impulses through a line of billiard balls in touch with each other. An impulse (Figure 6) is imparted by a driven ball striking the first ball, which is compressed, as shown in the figure by the lower ball; its elasticity by its expansion transmits the impulse to the next ball, with a slight loss of energy, and so on successively through the series until the last ball is impelled away as though no energy had been absorbed. The impulse corresponds to the current, the elasticity to the electro-motive force, and the ball to the Pupin section with its capacity (mass), its resistance to change of form and its resilience.

This is not unlike the action of air particles against the tympanum of the ear when carrying sonorous vibrations.

The size of coils and the distance apart is chiefly a question of experiment. It varies with every circuit. In fact, the solution of the problem is a case of experience and compromise. Sir John Gavey has obtained the best results with coils on long lines at one and one-eighth miles and at every two miles on shorter lines; Mr. Carty at every one and one-quarter miles on long lines, but at every three-quarter mile on short lines. The former gets better results with no iron ore, the latter prefers fine iron wire as a core. Mr. Gill, engineer-in-chief of the National Telephone Company, places them in certain definite cases at every mile and uses iron cores. These coils are enclosed in iron cylinders filled with resin oil and buried as shown in Figure 7.

It certainly apears to me that iron must experience some hysteresis, though very minute, and, therefore, be a cause of loss of energy, and though it must enhance the strength of the currents by intensifying the lines of magnetic force it is of more consequence to reduce the loss of energy and prevent the attenuation of the waves.

If the coils are improperly placed or imperfectly designed they do more harm than good. Thus coils which are quite effective at every mile may destroy speech altogether if lumped together at every four miles.

Among the numerous disturbing influences are those of the instruments at each end.

Not only does the receiving apparatus act as a reflector and inductor, but it is a source of secondary radiation and it causes interference and attenuation. This is very much aggravated by the constant changes of local lines at each end. Hayes has diminished this disturbance by tapering, or the gradual reduction of the inductance of the loading coils as the terminal stations are approached.

Tapering is distinctly beneficial. Virtually, as all oscillo-

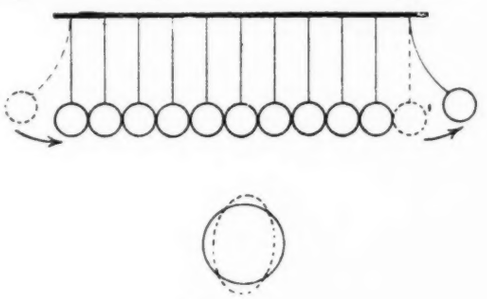


Figure 6.

grams show, it becomes a series of small waves of one frequency, probably, according to Kennelly, of about 800—upper G in the treble—which remains constant. There must be a slight loss of energy in each section of precisely similar percentage. The result is the curve of attenuation must be a logarithmic one, and its logarithmic decrement or attenuation constant is obtainable. The smaller this decrement is made the greater the length of the curve and the further speech can be carried. This is the function of the Pupin coil. The relative and continued attenuation of currents is shown by Figure 8, where (*1*) is an unloaded line, (*2*) a loaded line without tapering, and (*3*) the same line loaded and tapered. This is due to Mr. Hayes, of the American Bell Telephone Company, who read an admirable paper at the St. Louis Congress in September, 1904.

Through the courtesy of Mr. Gill I am able to exhibit some admirable models, which show the behavior of the voltage and currents throughout the whole circuit, with their changes of phase and their variation of amplitude. They are based on calculation and not on experiment. The white-colored line is the voltage (P.D.), and the red line the currents. They convey an admirable impression of the complicated character of the problem. The wave-length of the fundamental note, by loading, is reduced to one-third, and, of course, the velocity is reduced in the same proportion, but the strength of the received currents is increased from 2.7 to 3.30 milli-amperes. All disturbances are filtered out. Speech beiomes clearer and louder.

The inductance coils are usually of three classes:

Heavy, having	0.252	henry.
Medium, having	0.176	"
Light, having	0.133	"

Loading is not so efficient at present on aerial loops because it has not been so thoroughly thrashed out as on underground cables, but it is distinctly beneficial, and the solution of the more complicated problem is well in hand.

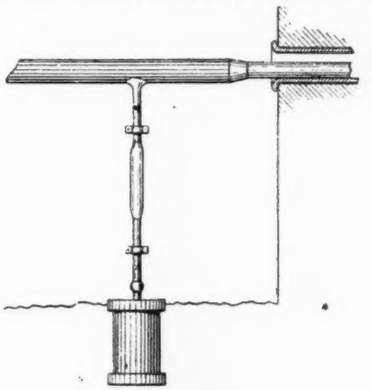


Figure 7.

At present the dimensions of the Pupin coils for aerial loops, as well as the spacing, have to be determined experimentally for each circuit.

The United States conference standard cable is:

Weight of copper(pounds)	20
Diameter (mils)	36
Resistance per mile (ohms)	44
Capacity wire to wire (microfarads)	0.06
Capacity wire to earth (microfarads)	0.088
Insulation (megohms)	500
Effective limit (miles)	41.6

in terms of ten-mile talk.

Effective limit does not mean effective commercial conversation. This would approach sixty miles.

Our English standard cable is now nearly the same, viz., No. 20 copper wire, of twenty pounds weight per mile, having a diameter of 36 mils., a resistance of 44 ohms per mile, a capacity of 0.056 microfarads, an inductance of 0.001 henry, and an insulation of 200 megohms. It would be a great advantage if this cable were made an international telephone standard. Mr. Gill has done so with this object in view.

Sir John Gavey experimented on the underground cable which was commenced under my guidance when I was in office in 1897. The cable consists of seventy-six wires laid up in pairs. Each wire weighs 150 pounds per mile, having a resistance of 5.5 ohms at normal temperature (60° F.). Each conductor is insulated with paper twisted in pairs, each pair being insulated. There are thirty-eight pairs arranged symmetrically and insulated in layers. The only insulation is dry paper and air, and the covering is lead. The diameter of the cable is two and one-half inches. The capacity is 0.063 microfarads per mile and the insulation about 30 megohms per mile. It is drawn into three-inch cast iron pipes. It was designed and laid for telegraphic purposes, but with the idea that for long distances metallic circuits might be commercially valuable without mutual interference.

In the extension of the system to Glasgow the outer layer of conductors was lapped with copper foil to act as a screen, a practice that had proved very successful in a sub-

marine cable from Bacton (Norfolk) to Germany. The length of cable from London to Birmingham is 115 miles, and, although unloaded, it was found possible to speak through it commercially.

The use of loaded lines is increasing rapidly. The equivalent range of speech has been increased in one case from 66 to 176 miles. This is an instance of an underground cable. Although in Germany they have found the ratio to be 1/4, in America it is thought that 1/3 is the outside commercial limit, and in Great Britain we find the range of a certain loaded line is 2.4 times that of an unloaded one.

I have been able to test (July 25, 1907) the relative efficiency of an unloaded and a loaded cable of what should be called the international standard pattern. I found that 8.3 miles on the former was equivalent to twenty miles on the other. This was 2.4 to 1. It was not a test of possible distance but of relative efficiency.

The result is not equally beneficial in aerial wires, for the conditions are more variable, especially in insulation and in atmospheric electrical troubles in countries like South Africa. Anyway, loaded lines will enable us to use less copper for long trunk wires—something of considerable advantage in these days of inflated prices in copper, and in countries like South Africa, where one long stretch of 1,010 miles has to bring, say, Johannesburg, to Cape Town.

The application of this principle to submarine cables has not yet reached a practical stage. Our president will have something to say on this. Prof. Pupin has the matter in hand on the other side of the Atlantic. The reaction coils must, however, be placed at such small distances apart that the manufacture of such a cable seems difficult and its maintenance problematic.

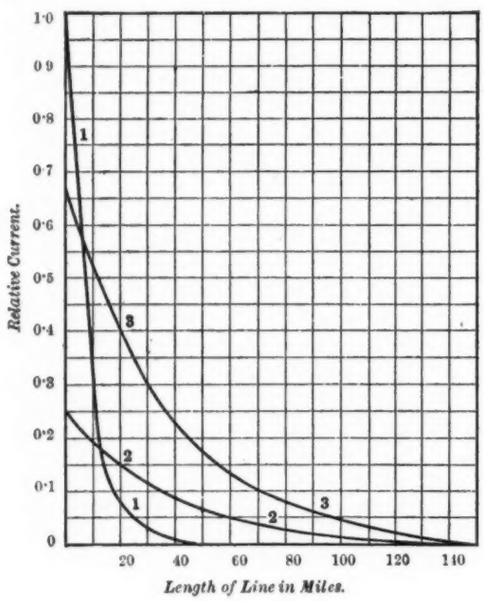


FIG. 8.

It is important to observe that in telephone circuits the frequency is not affected. If it were, speech would be impossible. It is attenuation that limits the distance. It is well known that in practice the higher notes (harmonics) superimposed on the fundamental notes (which give the quality of sound) are the first to disappear and that the last to remain are the low fundamental notes decreased in volume. The ear is so marvelously constructed that it adapts itself to all the perplexities of existence and it can interpret speech amid the turmoil of considerable external disturbances. We know little of its internal structure and less of the physical actions that render it such an exquisite analyzer of sonorous vibrations.

It has been assumed that the velocity of propagation of the current waves through the circuit is such that the action in each Pupin section is virtually simultaneous, and the action continues along the line. If we admitted geometrical length the physical explanation would be more complicated. A slower velocity in loaded cables means an increase to the limiting distance of speech. Hence the reason why the limit is reached so rapidly in cables and underground wires. On overground lines the distance to which it is possible to speak is limited only by the weight of copper. 2,000 miles is easily attained without coils.

The question of loaded underground cables against open unloaded aerial circuits is purely a financial question. The dominant factor is the price of copper. But the cost of maintenance, the reliability of working, and the freedom from troubles must weigh considerably in the balance. Every case must be decided on its own merits.

I cannot too often repeat the warning that telephone troubles arise principally from ignorance of the system of working, and that the principal source of trouble arises with the subscriber himself. The American knows this and does all he can to support the company which supplies him. The Englishman growls and writes to the press and thinks he has done a clever thing. Some wiseacre has even proposed to establish a Users' Mutual Protection Society to maintain the present unfortunate antagonistic system between supplier and user. The best protectors are personal self-reliance and self-education.

RADIO TELEPHONY TESTS SUCCESSFUL.

The first actual application of Radio telephony to practical work anywhere in the world was made at Put-in-Bay, on Lake Erie, during the week July 15 to 20, in reporting the regetta of the Interlake Association. The Radio Telephone Company installed the DeForest wireless telephone on board of the cruiser yacht "Thelma," owned by Commodore W. R. Huntington, of Elyria, Ohio, and also equipped a shore station at the Fox dock at Put-in Bay. The Thelma is thus the first craft in the world to be fully equipped with the wireless telephone, an honor which it is fair to say will make it historic in coming years.

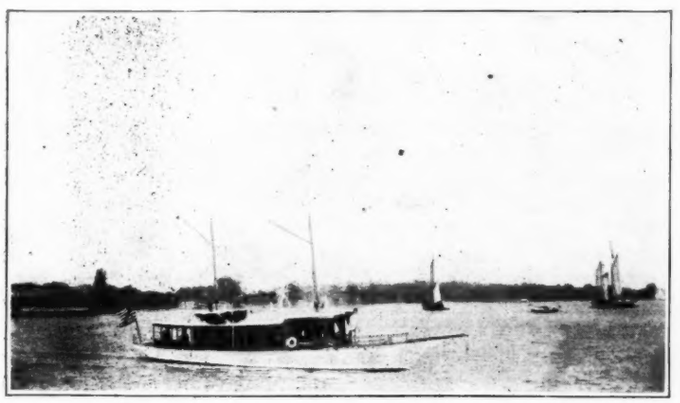
Although not well suited to the task on account of her short spars and wooden hull the Thelma gave a most excellent account of herself by the Radio telephone throughout the entire regetta. The distances which were attained exceeded the hopes of Dr. Lee De Forest, the inventor, who was in charge of the apparatus. The Thelma followed the competing yachts, or motor boats, around the course through most of the races and full and graphic accounts of the races were telephoned into the shore station, exactly as the events occurred. Speech alone was not transmitted during these convincing demonstrations, but singing, whistling and gramophone music or dialogues were interpolated with the news reports. It was really astonishing to note the clearness and fidelity of the reproduction. Friends recognized one another's voices without difficulty. The scratching of the gramophone needle over the disc after the record had been played through, even the tappping on the mouthpiece of the microphone transmitter with a pencil was distinctly heard at a distance of three miles from shore.

The greatest distance at which the reports from the yachts were heard and recorded was four miles, considered remarkable in view of the height of Thelma's spars and the power of the transmitter on board. Her equipment comprised a 220-volt generator of one kilowatt capacity, the De Forest oscillator and transmitter, and for the receiving apparatus an Audion detector and "pan-cake" form of syntonizer or tuner. Her aerial wires led through the roof of the wheel house to a small crossarm on top of the foremast and thence to a smaller arm on the mainmast. Ground connection was at first made to the propeller shafts

of her twin screws, but as this was found insufficient, more area was added by fastening two sheets of zinc to the yacht's hull at the bow.

Thelma is a trim little cruiser yacht of 17.82 tons net, length over all seventy-two feet, with ten-foot eight-inch beam and five-foot draught. She carries two 20-horse-power Lacy engines and is schooner rigged. The telephone dynamo was belted direct to the fly-wheel of her starboard engine, aft, and the rest of the Radio apparatus was mounted on a small table in her main cabin convenient to all.

On shore 110 volts direct current was available and this was transformed to 220 volts by a motor generator. This current was led through a rheostat and choke coils to the oscillator. Connected to this oscillator is a shunt circuit consisting of a condenser of peculiar construction and a primary coil, the exact number of turns of which could be varied at will to alter the tune or wave length of the electrical waves which were generated. A second coil within this primary had its upper end connected direct with the antennae or aerial wire while its lower end led first through the microphone transmitter and thence to the earth plate. In this way the changes in resistance in the microphone produced by the modulations of the human voice directly affect the intensity of the high frequency currents which are continually passing from the air wire to the ground plate. Inasmuch as the receiver instrument is affected exactly in proportion with the strength of the received electric waves, it is evident that every variation in the microphone resistance by the voice will be reproduced to the listening ear at the distant station by the vibration of the telephone diaphragm there. In other words, in the De Forest Radio telephone the high frequency currents, or electric waves, play the part of the direct current in the ordinary telephone; the ether transmits these waves in place of the old-fashioned telephone wire, and the responder or "Audion" at the receiver, translates these received oscillations into ordinary telephonic currents, which can affect the diaphragm to reproduce speech to the human ear. The micro-

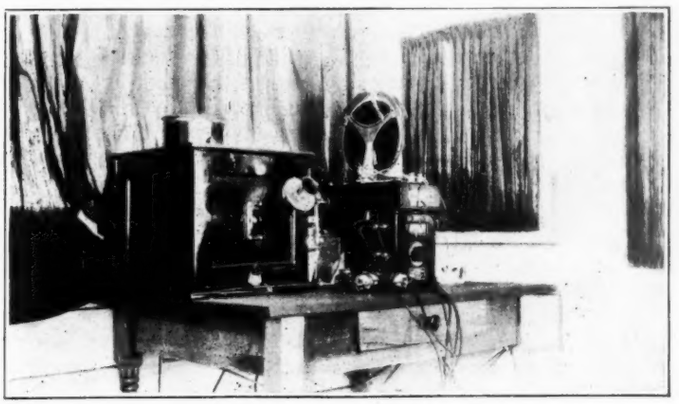


Cruiser Yacht Thelma, First Boat in the World to be Equipped with Wireless Telephone.

phone transmitter and the telephone receiver are exactly the same as used in the wire telephone with which all are familiar. The "oscillator" and the "responder" are the only new and additional features, and the ether takes the place of the connecting wire.

As a sample of the excellent service which the De Forest Radio telephone performed during the Put-in Bay regetta, the following synopsis of the report of the morning races of Friday, July 19, will be of interest. The man in charge of the shore station, not being a stenographer, it was possible for him to write down only the first words of a conversation, or brief headings of the reports. This illustrates incidentally the great advantage in point of expedition of business of the Radio telephone over the wireless telegraph. From three to four times the number of words can be transmitted in a given length of time:

"9:57½ a. m. I will tell you when the first boat crosses the line. First boat is about crossing the line—9:59. Spray crossed the line at 9:59. Spry crossed about twenty-five seconds after 9:59. Nine fifty-nine and five seconds is the exact time." (This was followed by gramophone music played on the Thelma.) Later: "Second boat just crossed, 10:07½. First in the cat boat race crossed at 10:01½. Cleveland finished second, time 10:03½; Borealis, 10:04½. Cleveland finished second. What shall I put down for you in the second race? St. Clair just crossed, 10:07½ (re-



De Forest Radio Telephone Apparatus Installed on Cruiser Yacht Thelma and Used in Reporting the Interlake Regatta at Put-in-Bay, Ohio, Week of July 15, 1907.

peated often). Hello, Frank. We will be back in about two hours. Osekita just crossed the line; you spell it, I can't. Time, 10:08½," etc., etc., until the races were finished and the Thelma started back for Put-in-Bay dock.

Upon the finish of the regatta the telephone apparatus from the Thelma and the Put-in-Bay shore station was shipped to Toledo, where it is the intention of the Radio Telephone Company to install it permanently, where it can be in communication with other wireless telephone sets to be installed on vessels sailing Lake Erie. The great lakes offer, perhaps, the most promising field anywhere in the world for the first general application of this new invention to the needs of a merchant marine, and it is the intention of the company to at once enter this promising field.

In years to come it is safe to say that dwellers in this region will recall with pride that the first practical wireless telephoning was inaugurated at Put-in-Bay.

NEBRASKA MEETING.

The annual meeting of the fifth district of the Nebraska Independent Telephone Association was held at Wymore, July 30. Twenty-one delegates from Gage and adjoining counties were present. Among improvements discussed to be taken up soon are toll lines from Wymore to Marysville, Kan., Pawnee and Falls City. General discussion of improvements and methods took up the afternoon session. In the evening the business men of the city were invited in and the extent and object of the Independent telephone movement was explained to them. The delegates expressed themselves as being well pleased with progress during the last year.

JAPAN EXTENDS ITS TELEPHONE SYSTEM.

The Japanese Department of Communications intends to establish telephone exchange offices at 130 more cities and towns, the work to cover seven years, and at the cost of over $10,000,000. This year about a dozen exchange offices were established, out of the list of eighty places which applied.

EARLY OPERATING METHODS

A Description of the Apparatus Employed in the early days of Telephony from the Operating Bulletin

By J. G. Wray

IN response to a request for a description of some of the earlier operating methods employed by the Chicago Telephone Company I will explain the way a telephone call was handled at Chicago's first telephone switchboard.

I wish to acknowledge my indebtedness to Mr. J. J. O'Connell of the engineering department for most of my information regarding operating conditions in the early days. Mr. O'Connell was an operator on the first telephone switchboard. This, of course, was before telephone managers had discovered that girls make much better operators than boys or men.

The first switchboard was located in a building facing on La Salle street, where the Stock Exchange building now stands. It was installed in an office used also for fire-alarm and for messenger-boy service. It was equipped for 200 grounded line circuits. At that time there were not 200 telephones in the entire city of Chicago, where now there are about 140,000 telephones. There were no lamps or other signals on these lines.

In addition to his telephone line, each subscriber was connected with a number of other subscribers to a signal circuit used for calling messengers, for watch service, fire-alarm service or any other special service contracted for by the subscriber. At the subscriber's premises was the usual little iron box, with a handle and a pointer. If a messenger boy was wanted, the subscriber would pull the handle of the call box down, and this would start a tape register at the central office and record the subscriber's number on the tape by the usual dots and dashes. The man in charge would read the number on the tape, look up the address, and then send the messenger boy, just as is done to-day.

In case of fire, the subscriber would turn the pointer of his call box to "ten," and this would record his number on the tape, followed by ten dashes, indicating a fire call. The attendant would immediately call the fire department by telephone and give the location of the fire.

Now if the subscriber wanted to talk on his telephone, he worked the handle of the same call box, except that he put the pointer at the figure "one" instead of the figure "ten." This recorded one dash on the tape after the subscriber's number. The attendant, noting that the subscriber wished to use his telephone, would call off the subscriber's number and his name through a speaking tube to a man located at the other end of the tube in the telephone operating room. This frequently required the attendant to look up the subscriber's name in his record book. The man or boy receiving the number and name through the speaking tube would then call them off to a switchboard man. The switchman handled the plugs and cords and made the connections. Other men, calling operators, were provided with ringing keys and with a single solid brass plug for signaling the subscribers and assisting in making the connections.

The switchman had in front of him the line terminals, or what would correspond to the answering jacks without any lamps. He also had in front of him the cord and plugs, hung from the top of the switchboard and connected to the telephone sets of the various operators. There were five operators, and each operator's set was arranged to connect with only one pair of cords. To-day an operator's set is arranged to connect with seventeen pairs of cords, and practically every operator has at least fifteen pairs. Each operator was provided with two ringing keys, one for each cord of the pair, and these were known as the "right" and "left" key. He was also provided with a solid brass plug which could be used to connect the operator's set to either cord independent of the other, or to connect the two cords together. The operator did not handle these plugs and cords; they were located in front of the switchman and were handled only by him.

Now to return to the switchman: In addition to the operator's plugs and cords before him on the switchboard, he had hanging about his neck a dozen or more cords with a plug at each end. When the man at the speaking tube received an order for a telephone call, he would repeat the number and name—say, "21—First National Bank," to the switchman. There was only one office in those days, so prefixes were not necessary.

The switchman, upon receiving the order, would plug in with the right-hand plug of a pair at the switchboard, and then call out to the operator connected to that pair of cords: "Joe, First National on your right." Joe, the operator, would use his brass plug to connect his telephone set with the right-hand cord, and operate the right-hand key, thus ringing the subscriber's bell.

To return to the subscriber: After he had sent in a call for telephone over his messenger call box, he would have to wait until the operator rang him back, as just described. He would then use his telephone and instruct the operator to connect him with some other subscriber, giving the name of the party he wanted, say—"S. P. Rounds." Then he would leave his telephone, expecting to be called back some time later when his party had been reached.

The operator, Joe, upon receiving request to connect the First National Bank with S. P. Rounds, would call out to the switchman, "S. P. Rounds." The lines were all plainly marked with the name of the subscriber. The switchman would take the other cord of the pair and connect it to S. P. Rounds' line, after which he would call back to the operator and say, "On your left," and forthwith Operator Joe would use the brass plug to connect his telephone set to the left cord, and would operate the left key to signal the subscriber called for. He would remain listening on the circuit until Mr. Rounds, the called subscriber, answered, when he would say, "The First National Bank wants to talk to you." He would then transfer the plug back to the right cord and again ring the First National Bank bell. When the First National Bank had answered he would say, "I'll connect you now," and would then use the brass plug to connect the two cords together, and thus put the First National Bank and Mr. Rounds into telephonic communication.

As the operator was equipped with only one pair of cords, he had to devote his entire time to a call until the parties were connected and began to talk, after which he would have to wait until the switchman released his pair of cords from this connection. To do this the switchman used one of the cords hanging about his neck, connecting a plug to each of the subscriber's lines.

There were no supervisory signals on the cords. If the subscriber remembered to signal disconnect he could do so by setting the pointer of his call box to "two" and pulling

the handle, thus giving the signal on the tape register in the same way that he first signaled his desire to use his telephone.

This method of giving telephone service was an outgrowth of messenger boy, watch service and fire-alarm service. The apparatus and switchboards used were nothing like the switchboards of to-day. Telegraph apparatus was used, as no telephone apparatus, except the telephone itself, had been invented. As can be seen from the description, the service was extremely slow; furthermore, the operating loads were very small. To-day a subscriber is able to get his party in less than half a minute from the time he starts his call; in those days it required two or three minutes.

The foregoing description of the method of operating the first type of switchboard in Chicago is given with the idea that it may be of interest to some, and will show to all the tremendous advance in the art since that time.

A LETTER FROM JAPAN.

The following letter has been received by TELEPHONY from far-away Japan:

Kyoto Telephone Exchange Office,
Kyoto, Japan, July 18, 1907.

To the Editor: Please answer in the columns of TELEPHONY the following questions relating to the Homer-

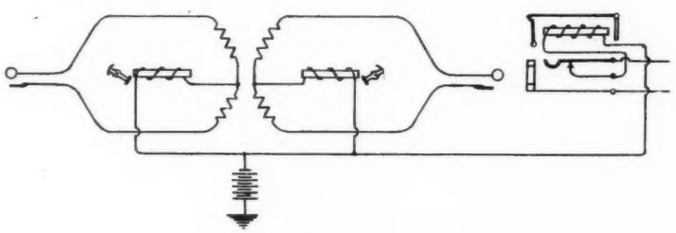


Figure 1.

Roberts lock-out party line system, which is described on page 404 of the June issue:

1. By what connections of circuits may any subscriber, desiring to use the line in an emergency, signal the operator by mere up and down motions of hook switch while any conversation may be going on by another subscriber on that line?

2. By what connections of circuits may any subscriber except station 1 signal central office by taking off the receiver from the hook? I understand that station 1 may signal central office by usual manner, but it seems to me stations 2, 3 and 4 cannot as the circuit is open at the springs 2 and 3 at station 1 when the line is free. Please give explanation particularly about this.

3. By what connections of circuits may any subscriber be automatically rung (called) who, knowing the line is busy, takes off his receiver from the hook and is waiting for the notification that the line is released by the other subscriber? Very truly yours, M. TONEGAWA.

Replying to the above the following is submitted:

1. When a conversation is in progress on a Roberts party line, the supervision by the operator is entirely automatic, and is accomplished as follows: The supervisory signal for each end of the cord circuit consists of a mechanical signal of the central energy type; this is connected between a 20-volt battery one pole of which is grounded and the central point of the repeating coil in the cord circuit. (See Figure 1.) Normally the external circuit is free from grounds, and therefore the cord signal is not energized. The circuits at the subscriber's station are so organized that when a party on the line is given a talking connection, by hanging up his receiver he is enabled to establish a circuit which grounds the line at his instrument; this operates the mechanical signal at central and notifies central that he is through talking. The ground circuit at his station is broken when the operator locks out that subscriber's instrument. When a subscriber is using the line, his receiver is off the hook, and therefore the line is free from grounds. When any other subscriber lifts his receiver from the hook the line is momentarily grounded by the three springs of the hook switch all contracting together during the central portion of the stroke. This establishes a momentary circuit over the unbroken side of the line to central, and causes the mechanical signal to wink. A series of movements of the hook switch causes a series of winks, and notifies the operator that an emergency call is being sent in. Figure II shows three instruments on a Roberts line. No. 1 instrument has been placed in past condition to enable central to ring II; No. 2 instrument has been rung and placed in talking circuit. No. 3 instrument is normal in every respect.

2. When the line is not in use the line drop is connected between the unbroken side of the line and the grounded 20-volt battery, and is in a condition to operate when the circuit to ground is completed. See Figure I. When any subscriber on the line lifts his receiver, that act momentarily grounds the unbroken side of the line (see Figure II) and the line drop is operated. It will be noted from the foregoing that hand generators are not used in the subscribers' instruments.

3. By removing his receiver the subscriber connects the tip side of the left line through the upper hook switch contacts to Spring 1 on ringer which partially establishes a ground connection, which connection is completed when the ringer armature commences to move in passing direction. If now with a station in this "set" condition the operator attempts to restore the line, the impulse which would otherwise operate the line relay to pass this station, is short circuited by the ringer armature completing this ground circuit, the generator being grounded at central. By suitable signal mechanism the operator is apprised of this condition, whereupon the bell is rung.

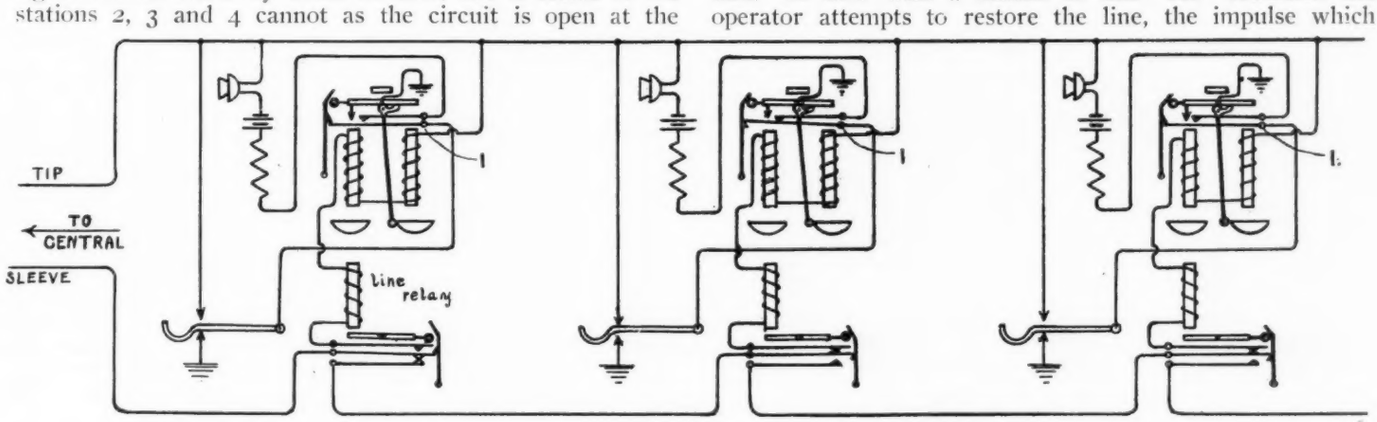


Figure 2.

CONVENTION PAPERS

Some Interesting Addresses Made at Recent Independent Telephone Meetings

TELEPHONE LAW IN OHIO.

AFTER what your president has said it is needless for me to tell you where I come from. I come from a place called the "Gibraltar of the Bell Telephone Company," and when the gentleman who spoke just previous said there was no place in the state of Ohio where anybody feared the Bell Telephone Company I do not hesitate to admit that personally down there we do fear it a little bit. I am only your guest to-day by the kindness of your president. Our company never yet has got a tangible enough existence to entitle me to be a member of your association, yet I feel that the subject which has been allotted to me and about which I have been asked to talk, is one that should be of interest to all of you even if it is only an incidental interest. You may all of you remember our attempt to get a foothold in the city of Cincinnati. The chapter of the telephone law in our statutes—which is the same chapter that applies to telegraphs when methods were antiquated—provided for the only means of construction that was known in those days, and in providing for that used the terms which were applicable to that kind of construction, and therefore our courts, while the telephone methods have progressed, the law seems to have been immutable and the courts seem to have been without any idea of keeping pace with the progress of construction. There is one celebrated clause in the statute that provides for the use of the streets of the municipalities and provides that in case there may not be an agreement as to the manner of that use, or the mode of that use between the state and the telephone company, the probate court shall be and is invested with the power on proper application to institute an inquiry and ascertain and declare the mode and manner in which the applicant shall make use of the streets of the said city.

You are all aware of the history of the litigation that arose about that particular section. You may recall that it was at first held invalid because it was said to be giving a court legislative power. It was afterwards, upon some application and argument to the court, held to be valid as not necessarily involving anything more than a judicial inquiry. Now I feel that I know what that law means, and it is no shock to my modesty to say so. I mean I know in so far as our supreme court has declared what it means, but what there is in it further than the courts have decided no man can know. It provides in general terms after the application is allowed by the probate court that the court shall thereupon fix the mode and manner so as not to discommode the public. The argument of the court and the holdings of the courts, possibly in view of the laudable desire to protect the public as against people who are claiming to exercise franchises and rights in matters of public utilities, is that inasmuch as at the time those laws were passed subway construction was not known or thought of, and probably was not a possible thing in telephone construction, because I recall, and you all probably recall, there was a time when, by the process of induction, it was thought that to put wires together that were underground or even together in the air was not possibly a scientific thing, and they held therefore that that particular section of the statute did not on its face indicate that the court had any power to authorize as to the mode or manner of using the streets with the only kind of construction which in certain localities is possible, because you can all appreciate in the business streets of a crowded city the very idea that the court makes the order so that the public will not be discommoded would on account of discommoding the public necessitate the use of it in that manner. There is another section of our statute which provides that any telephone company operating an exchange may apply to the city for subway construction, but it provided further that no company should erect or use overhead construction where there has been a subway constructed. It was thought that this section of the statute reflected back upon section known as 3461 which had this curious history I spoke of in our courts, and that it apparently provided for obvious reasons for the application to the city where the company has already an exchange in operation, because it was not in a position where it had disagreed with the city and therefore it would have no right to go into the court to have the mode and manner fixed, and therefore the application to the city was a reasonable thing to exact of a company already in existence. When it said no company it did reflect and throw light upon section 3461 and indicate that that was a full execution of the law and that the probate court had the right to do that thing which it was especially enjoined to do without discommoding the public in the only way that would not discommode them and in the only possible way they could order it done at all. The supreme court, however, held in our case that there not only was no power under section 3461 in the probate court to order any underground construction but there was no power to get underground construction except an agreement with the city. We are in a position, therefore, of not being able to get any agreement with the city for the reasons that are obvious to anybody who knows us, and at the same time if we make an application for that method which the probate court has a right under ordinary circumstances to grant us then we come upon two propositions that are truly indefinite, and which an unfriendly court would universally decide against us, and that is that in the first place where subways have been constructed—and it has even been argued because we have another proceeding pending down there now that means if a subway has been constructed and was in the streets it belonged to the Bell Telephone Company. We get our rights from the city. In the manner of using the streets where we do have to go to the city council or to the courts, the courts must decide against us if somebody, to-wit: the Bell Telephone Company, is already there.

The other proposition, which is so truly indefinite, is the worse, which relates to the granting of it so that it will not discommode the public. In other words, the court will say to us as it has intimated, "We can not order subway construction in the crowded parts of the city as it would discommode the public and therefore we would have to give you the right to overhead construction, but inasmuch as overhead construction is appropriated therefore we can not give you anything at all"; and the worst of the whole thing is that the Bell Telephone Company is in possession.

Now, gentlemen, I have only come here to talk to you, if I am able to in a business way, because I feel that you have come here mainly for business purposes, although there is a social feature connected with your gatherings. But the territory of the state of Ohio is not fully occupied by Independent telephone companies and organizations until the citadel surrenders. The gentleman who preceded me spoke of evolution. Evolution is going on. I had an example of that just the other day. The president of a national bank in Cincinnati with whom I was lunching and who was a bitter opponent of the two telephone companies two years ago, when we first made our application, voluntarily broached the subject to me and told me that one of his directors—the most influential director he had in his bank, the president and largest stockholder in one of the great interests of Cincinnati—had told him that he was losing business all the time because they did not have Independent telephone connection with the city of Cincinnati. That is only an example of what is occurring down there all the time. Yet that may be too slow. I never yet have been able to impress the people with the idea that two telephones are not a nuisance if they pay you, any more than two commercial agents or two travelingmen are a nuisance if you need them. They are a nuisance if you can get one to do the business or if you can not and each pays you then you must have the two, and it is simply a question of whether or not two telephones in your place of business are going to pay you.

But they all look at it simply from the standpoint of convenience or inconvenience of handling the instruments themselves. But I say, gentlemen, I do not care whether it comes about that way or in some other way, just so it is brought about. You cannot afford, gentlemen, to be shut out from one of the largest cities of the state and if the Bell Telephone Company is suppressed outside of the city of Cincinnati it will not be long before the citizens of Cincinnati will suppress it. In other words, there are two ways to bring that about, and they are both operating to bring it about, I am glad to say. One is that of evolution on the part of our home merchants and home people; that evolution, which is building up the Independent movement, and that evolution which is going on outside of the city of Cincinnati throughout the rest of the state and which is quietly and surely destroying the Bell interests.

Now, gentlemen, I cannot conclude without congratulating you upon what I have heard and has been reiterated at this meeting in my hearing, and that is the wonderful progress that your Independent interests have been making in the state of Ohio. There is one particularly obvious reason for it. Sometimes and often I have thought that the patent laws fail to accomplish one of their most valuable purposes. The object in the constitution of the United States and of the patent laws of the United States was for the purpose of encouraging and rewarding meritorious inventors. In seventy-five cases of a hundred which have come particularly under my observation, in the cases of some of these great patents that have been the fortunes of people, the inventor dies in poverty and the grasping money shark makes the money and he treats the people with contempt. It was the grafting monopoly and that contempt of the rights of the people that has brought the Bell Telephone Company to the position it occupies to-day—an expiring or-

ganization. There is a spirit coming over the people to-day, that, conservative as I am, I feel they go too far. It may go to the extent of confiscating people's property. You all know the signs of it. It is right in its start for us but it has not come yet. Reason and coolness require it to come to this field and that determination that the people are entitled to certain rights and they are going to have them, and that is what they have been having in the state of Ohio outside of the city of Cincinnati for six years past. That is why you have been prosperous and the Bell Telephone Company has been going down. Now, gentlemen, just one word more. Mr. Huling spoke about not interfering with the Bell telephone interests. I was fearful at first that he meant it did not concern this association at all, but I gathered a different meaning from his words as he went on. I have nothing practically to propose with reference to legislation. It would not be proper at this time, but I do hope that you will always, as the other speakers have said, stick together, go on gathering strength as the snowball gathers snow as it rolls down hill, and that you will give your influence in either one of the ways that has been suggested to help us to become regular members of your association. I thank you.—*Paper Read by C. B. Mathews Before the Ohio Independent Telephone Convention.*

TOLL LINE CONNECTIONS.

It seems to me that it is almost self-evident that any Independent telephone man must of necessity answer the question in the affirmative—"Is it to the interest of telephone users that all toll lines connect with local exchanges on equal terms?"

The whole fabric of our institutions is built upon the principle of equality before the law, special privileges to none. And however far we may depart from it in the stress and storm of competition still sooner or later we must, as right minded and honorable business men, come to the proposition that what is for the interest of the many must be the rule of business life.

The greatest good to the greatest number is not a worn-out formula, but a vital principle that must govern in business as well as in ethics, and any departure from it must sooner or later work to the harm of the aggressor and cannot be defended even from a business standpoint. With this by way of preface let us inquire into the motives that lead a toll company to refuse to connect with a rival or competing line. It is not supposable that any toll line has so much business that it is unable to take care of the additional business that would follow such connection, for the additional business would warrant additional equipment and so in some degree increase the probabilities of profit.

And again it is not the good of those now having connection that could possibly actuate a company in refusing service, for it is a well established principle of telephone law that the value of telephone service is in direct ratio to the number of telephones within call, so that any connection, however insignificant, adds in some measure to the value of existing connections. Nor is it conceivable that a weak company would refuse to connect with a stronger one, for weakness always welcomes and never repells an alliance with strength, so we are forced to conclude that it is the strong company that objects to union.

If these premises are justly taken, why shall we not welcome a law by which as "common carriers" the connection of all exchanges, farm and toll lines is provided for on a just and equitable basis, insuring the transmission to destination of all messages just as certainly as letters through the postoffice, telegrams to however distant points, packages by express or a car of merchandise by freight from one end of the country to the other?

If the refusal to grant the prayer for connection on the part of the toll company is fear that a rival will be built up, or that territory will be occupied by another that is coveted by the larger company or any other reason that will not bear scrutiny or that works to the detriment of the general public now using or certain soon to use the telephone for any of the uses of business and social life, then this policy is destructive and not constructive, to be condemned and not commended, and, in a word, indefensible from any standpoint.

If the Illinois Central Railroad Company, for example, should refuse to accept freight the destination of which was a point beyond their lines, the interstate commerce commission would, I think, at the direction of our strenuous president, be very soon sitting upon their case if not upon their necks. Yet this is exactly what is done every day by certain telephone companies in this and every other state, the policy being adopted years ago and maintained to the present time, notably by the American Bell and allied companies.

How this policy can be defended even from the viewpoint of a stockholder much less that of a patron of the company, is a matter too deep for me, but to the uninitiated it would seem to be another case of "the public be damned."

This association has in the past maintained at Pierre during the sessions of the legislature a representative whose duty it was to lobby against bills looking to the connection of toll and Independent or co-operating companies, and has reported the result of such effort to this convention. Now I do not wish to be thought a critic of the past action of this association, but may the time not have arrived when a different policy shall be inaugurated and this association go on record as favoring the connection of all toll companies and local telephone companies on equal terms? I do not see how this can work a hardship to the toll company, as the law must fix a just and equitable rate of compensation between them, and it will certainly be a boon to the users of a great public utility, whether patrons of the one company or the other.

But admitting for the sake of argument that it is not to the financial interest of the toll company to connect with all local companies, yet no one could successfully maintain that it was not for the benefit of the telephone user; then how can we as Independent telephone men take any other position than one favoring such connection even if it must be compelled by the strong hand of the law?

It cannot be urged that such a law is revolutionary for already it makes such provisions in the case of "common carriers" such as railroads and express and telegraph companies and if the provisions of such a law are equitable it can work no injustice.

And in conclusion let me urge that this association put itself on record as in favor of such a broadminded and equitable measure as shall weld into one harmonious whole the somewhat conflicting interests of the telephone companies of this grand commonwealth.—*Paper Read by A. S. Hall Before the South Dakota Independent Telephone Convention.*

THE IOWA CLEARING HOUSE.

The Independent telephone clearing house of Iowa records its first annual statement of work actually performed. We are no longer entirely in the dark regarding the advantages of the institution to the Independent telephone cause of this state, to the public and to the financial interests of all telephone companies associated therewith. The first two months, January and February, 1906, were occupied in providing those companies who were under contract at that time with full details regarding the methods of our system of accounting, securing from them information regarding their lines, stations and exchanges.

The first months' business cleared was for the month of March, since which time we have shown a gradual increase as follows:

Amount of business cleared—

	Increase.
April over March	246%
May over March	316%
June over March	352%
July over March	475%
August over March	496%
September over March	555%
October over March	644%

This gradual increase in the gross amount of toll business cleared is very gratifying indeed, and when you understand that there are thirteen companies who have signed contracts for clearing house service who have not as yet made a report to this office, you can understand that during the immediate future the percentage of increase each month will continue in a larger ratio than in the past.

Since the first months' clearance up to the completion of the prorating of October business we have not increased the number of employes, having in mind securing the greatest efficiency at a minimum cost. We have arrived at that point and find that it will be more economical to increase the number of employes and thus shorten the time consumed in completing reports to the several companies of their balances. This will reduce the cost of clearance to each company.

As a matter of general information a report of this character is most easily grasped and understood when the results obtained are recorded in percentages for obvious reasons. The actual figures representing clearing house transactions are incorporated in my report to the stockholders of the clearing house.

We have now forty-three companies who have signed contracts with the clearing house (ten recently). Thirty-three companies have reported details concerning their several systems as follows:

767,549—Population of the cities and towns whose exchanges and toll stations are reached directly by lines of the clearing house not including population within the limits owned by the New State Telephone Company.

135,685—Independent telephones including rural telephones controlled by members of the clearing house (not including the telephones owned by the New State Telephone Company).

25,865—Bell telephones in this same territory covered by clearing house lines.

The following number of miles of wire (air line distance) are shown on clearing house map No. 9:

Copper	3,300
Iron metallic	8,862
Grounded	1,796
Total	13,958

From this you will understand on account of the circuitous routes between stations that the actual number of miles of wire is far in excess of these figures. You will pardon me if I refer to a

line of thought outlined some time ago before many of those present as follows:

"An analysis of the toll records of several companies (Bell) and the determination of the earnings per unit of population has enabled me to determine the extent to which expenditures for the building up of the toll line system can be safely made. The general average of earnings per caput in all of the companies has increased in the last ten years from twenty to fifty cents. In 1903 the lowest average per caput in any company was twenty-four cents and the highest about one dollar. Except in territories showing the very lowest average, we should not hesitate to make fifty cents per caput the basis for extensions to new points, and for the territory of all companies which show average earnings above the general average we should apply the general average of their particular territory. Experience has shown them that in order to meet the depreciation and maintenance charges in toll lines the gross receipts should amount to at least twenty per cent of the toll line cost. They do not hesitate to recommend the construction of extensions to a toll line system whenever the prospective earnings will amount to twenty per cent of the estimated cost of the extension.

"As an example, consider two towns, each with a population of 1,000 and located twenty miles distant from each other. The cost of the line to connect these towns will be, say, $4,000. The anticipated earning per caput is forty cents; this gives a gross earning of $800, or twenty per cent of the cost of the line. If these towns were forty miles apart instead of twenty miles, and the cost $8,000 instead of $4,000, the gross earnings would be only ten per cent of the cost. Such a line might clearly be a bad investment unless the toll line company could rent pin space to farmers' companies at a price which would not only encourage the farmer but furnish additional telephone subscribers who would increase toll earnings.

"The toll earnings per unit of population should be made the factor in determining the advisability of the construction or extensions of toll lines as well as the basis for all computation regarding the toll earning capacity in any locality instead of the amount of earning per subscriber, for the reason that the percentage of subscribers to population is such a variable quantity.

"I have before me a statement (Bell company) of toll conditions in exchanges: Number of public stations, 57; number of subscribers, 7,440; population, 142,668; out-going toll receipts one year, $114,060.85; average receipts per caput, .801.

"Statement of toll conditions with public stations only: Number of public stations, 27; population, 6,998; out-going toll receipts one year, $4,005.10; average receipts per caput, .572.

"Agricultural districts, comprehending small towns: Number of public stations, 19; population, 9,349; telephones, 1,671 exchanges, 1,039 rural; total, 2,710; out-going toll receipts one year, $4,530; average receipts per caput, .49.

"Commercial districts, comprehending principal exchanges having competition: Number of public stations, 10; population, 19,925; telephones, 2,308 exchanges, 1,095 rural; total, 3,403; out-going toll receipts one year, $3,630.40; average receipts per caput, .28."

Wherever the amount of toll earnings per subscriber is unusually large a low percentage development in subscribers is generally found. It is, therefore, very misleading to quote the toll earnings per subscriber as an indication of the development of an exchange. The larger the subscriber development, the larger will be the toll earnings per unit of population, but the smaller per subscriber. It is, therefore, believed that the only reliable basis for calculation of earnings upon the toll line investment is the anticipated amount of earnings per caput, i. e., per unit of population. The average toll earnings of any half dozen places in a given territory where the local conditions are the same, rural or commercial, will show approximately the average of the whole territory. Low earnings per caput may indicate any one or all of many unfavorable conditions, among which are lack of toll facilities, poor service, competing toll lines, competing exchanges, etc. The amount of earnings on toll investment is dependent upon all of these contingencies—added to which are the ratio of mileage of toll lines to population and the number of circuits per mile of line.

It is found, as a general rule, in a territory where cities and towns are situated far apart the receipts per caput are large when compared with a territory where the cities and towns are near together. It is found that the earnings per mile of circuit are greater where cities and towns are near together.

What do these figures signify?

That we Independents in Iowa have the population, the exchanges and only lack the facilities to control the toll line long distance business which originates and terminates in Iowa.

It is now up to you to say whether this volume of business will be neglected. As before mentioned, a population now within the clearing house lines of over 767,549 if computed on a basis of 25 cents per caput means $191,887 per annum, aside from the preservation of your present investments and the recent voluntary cut on long distance. Toll rates within the first 100 miles indicate that the other telephone companies concede that we have what we claim.

Heretofore Independents have been disposed not to build toll lines any great distance, as they prefer to exercise jurisdiction over the money collected for tolls, and have even gone so far as to refuse to allow talks and reverse the charges when the call terminated beyond their lines.

Now through the medium of the clearing house they are just as safe in reversing charges on clearing house stations as though they had the cash for the call.

Our system of cross checking possesses several advantages, the most important of which is that it results in a discipline which produces accurate record of all calls on the part of all operators.

The fact that errors are discovered quickly and brought home to the operator tends to make them careful. A second advantage is that the error is also brought to the notice of the originating subscriber so quickly that there is little trouble in making collections. All toll accounts are kept up to date and toll bills can be made out promptly. There is no question in my mind but that a large percentage of your toll bills (especially interchanged business) you would be willing to discount fifteen per cent and even twenty per cent to have settled, particularly when they are two or three months old after the conversation took place.

In the purchase of standard forms of accounting we are enabled to effect a very material saving to members of the clearing house, purchasing toll tickets in quantities of three million tickets in one order. Our form No. 1 (summary form) in small quantities cost us $6.00 per thousand and in quantities of ten thousand we are able to secure them at $4.00 per thousand. Our form No. 2 (check ledger) we buy in fifty thousand lots at $2.00 per thousand. All these forms are pen ruled. We are therefore saving clearing house companies at least fifty per cent on their stationery.

The clearing house is the institution which not only settles but collects all balances between clearing house companies and your traffic committee, consisting of C. C. Deering, president; P. C. Holdoegel, vice president; J. M. Plaister, secretary and treasurer; C. G. Cockerill and E. H. Martin, have recently instructed that all business sent to the clearing house to be prorated represented in the clearing house by toll tickets shall be prorated beginning with January business. This means that business originating at foreign stations (non-clearing house stations) going over clearing house lines shall be prorated. The clearing house company which switches said messages onto clearing house lines shall be responsible for the toll charges to other clearing house companies.

I have prepared a chart showing the history and development of the clearing house covering the first seven months' business.

As you see by the diagrams the assessment for clearing and collecting and distributing proceeds for the first seven months was twelve and one-half per cent of the gross amount cleared and the expenses for handling October business was ten per cent. The errors detected were five and three-tenths per cent of the gross amount cleared, of which we collected and remitted to the several companies thirty-five per cent of the errors detected, the sixty-five per cent of errors detected which we did not collect for is explained as follows:

20%	represent errors in routing by the clearing house.
20%	represent messenger fees not reported by sending station to receiving station.
30%	represent failed calls where no talks took place, although the "out" ticket may have been marked failed and the "in" O. K.
3%	represent deadhead calls not authorized by clearing house pass.
10%	represent reversed calls not so reported to receiving station.
65%	
35%	collected for and remitted.
100%	

—Paper read by George T. Hewes before the Iowa Independent Telephone Convention.

Telephone operators in Chicago have been greatly annoyed by mashers of late, and special police have been detailed to patrol the neighborhood traversed by the young women as they go to and from their work.

The South Dakota state board of assessment has completed its work on telephones and telegraph lines in the state and has increased valuations on both these classes of property. The increase on telephones amounts to $223,000 over the valuations of last year.

Samuel Hooper, architect for the provincial government of Manitoba, is preparing plans for a new telephone exchange to be erected by the government telephone and railway department. The building, which will cost $100,000, is to be built on property purchased for the purpose on southwest corner of McDermott and Charlotte streets, Winnipeg. The structure will be of brick and stone and entirely fireproof. The building will be completed early next year.

DECISIONS AFFECTING TELEPHONY

By Gilbert W. Hand

EMINENT DOMAIN IN MISSISSIPPI—MEANING OF "NEW LINE" OF TELEPHONE.

SECTION 925 of the code of 1896 of Mississippi provides that all "companies or associations of persons incorporated or organized for the purpose of constructing telegraph or telephone lines shall be authorized to construct the same, and set up and erect their posts and fixtures along and across any of the public highways, streets or waters, and along and across all turnpikes, railroads, and canals, and also through any of the public lands; but the same shall be so constructed and placed as not to be dangerous to persons or property, nor interfere with the common use of such roads, streets or waters; or with the convenience of any land owner, more than may be unavoidable, and in case it shall be necessary to cross any highway, the same shall be so constructed and placed as not to interfere with the common use of such roads . . ." In the same chapter of the code provision is made for the exercise of eminent domain by such companies. A different section and chapter says that "telephone and telegraph companies, chartered under the laws of this stat,e may acquire a right of way across railroads by condemnation by proceeding in accordance with the provisions of this chapter." The Cumberland Telephone & Telegraph Company sought to acquire rights along the right of way of the Yazoo & Mississippi Valley Railroad Company under the authority of the first sections referred to above. The railroad company denied the right, insisting that inasmuch as the telephone company in question was a foreign corporation it had no authority to enter on the railroad's right of way by eminent domain proceedings. The supreme court has held in an injunction proceeding brought by the railroad company to restrain the proposed action of the telephone company that the right to acquire a right of way along railroads is not limited to companies chartered under the laws of Mississippi; that the authority of the last section referred to above relates only to crossing railroads and not to locating lines along them and that the question whether a foreign corporation has this authority to cross would be decided when the question came before the court, suggesting the possibility that a question might then arise whether foreign corporations have this right.

The railroad company also insisted that inasmuch as the telephone company had a line, though circuitous, between the different towns which it proposed to connect by the line along the railroad right of way, the power of eminent domain could not be exercised in behalf of the telephone company. The supreme court said: "It is our view that a new line is constructed, within the meaning of the statute, whenever the telephone company changes its route from that already occupied by it, involving the necessity of taking and occupying land not heretofore occupied by them." A similar case against this telephone company brought by the Mobile & Ohio Railroad Company to restrain the construction of another telephone line was similarly disposed of by affirming the contentions of the Cumberland company, advanced in the Yazoo railroad case.

Cumberland Telephone & Telegraph Company v. Yazoo & Mississippi Valley Railroad Company, 44 *Southern* 166.

NEGLIGENCE FOR FAILURE TO TRANSMIT TELEPHONE MESSAGE OVER CONNECTING LINE.

The following facts presented the occasion for a suit for damages by one I. C. Oliver against the Sabine Valley Telephone Company, the Texas Central Telephone Company and the Commercial Telephone Company: Oliver resided at Center, Texas, where he was June 18 and 19, 1904. His wife and child were visiting at her mother's, some six miles away at Nacogdoches. On June 18 Oliver's brother-in-law went to the office of the Commercial company at the latter place and put in a call for Oliver, telling the agent that Oliver's child was ill, and that he was wanted at once. After waiting about half an hour, Tindall was informed that Oliver was not in town. The child continued to grow worse and died on Sunday evening. At the time the first call was put in Oliver was at Center and was easily accessible to the telephone station. The Commercial company has a line running from Nacogdoches to Timpson, a near by village. The Sabine company has a line direct from Nacogdoches to Center and by some arrangement this company and the Commercial company send messages over each other's lines. The court of civil appeals said with reference to the liability "The liability of the Sabine Valley Telephone Company depends upon the nature of its connection with the Commercial company, unless the call for Oliver on the 18th was actually received by that company, accompanied with the notice of the purpose for which Oliver was wanted, showing the urgency of the call and the dangerous illness of the child. The agents of the Sabine company at Center deny the receipt of the call on the 18th. If the call was not in fact received, or if it was received, but was only a call for Oliver notifying him that he was wanted at the telephone, without any information to put the said company upon notice that the call was urgent on account of the illness of Oliver's child, the Sabine company would not be liable unless there was such a business connection in the sending of the message between Nacogdoches and Center between the Commercial company and the Sabine company as would make the Sabine company responsible for the negligence of the Commercial company. If the Commercial company was the agent at Nacogdoches of the Sabine company for the purpose of receiving telephone messages to be transmitted over its own line and other connections into the office of the Sabine company at Center, or if there was a partnership between the two companies in this business, then the Sabine company would be responsible for the negligence . . . of the Commercial company and its agents whether in fact the call was ever received in the office of the Sabine company or not."

Sabine Valley Telephone Company et al. v. Oliver, 102 *S. W.* 925.

MAXIMUM RATE DOES NOT PRECLUDE A HIGHER RATE FOR COMBINATION CITY AND COUNTRY SERVICE.

One Powell of Richmond, Kentucky, procured a franchise from this city to maintain and operate a telephone exchange and telephone system. The franchise was granted for a period of twenty years. In the ordinance granting it there was a provision that the grantee should not charge the citizens of Richmond exceeding the schedule of rates fixed in the ordinance. W. S. Moberly became a subscriber. Later the Richmond Telephone Company, the successor of Powell, extended its lines into the country and adopted a schedule of rates higher than those provided in the ordinance for the privilege of talking with all its subscribers. Moberly refused to pay this higher rate and brought suit to compel the company to give the service

for the lower price. The court of appeals said in disposing of the matter: "The real question here is the construction of the franchise granted in this instance. It purported to grant, and could only grant, a franchise *operative within the city*. The schedule of rates, being silent as to service or tolls beyond the city limits, must be construed with reference to the service to be rendered, or tolls to be charged, within the territory co-terminous with the franchise granted. Even though it be conceded that the city could have lawfully imposed the condition to its grant that city subscribers should be charged not exceeding a schedule fixed by the city ordinance for service both in and out of the city, that was not done in this case. The company did not, therefore, violate the ordinance conditioning its franchise when it proposed to charge a higher rate for its country service."

Moberly v. Richmond Telephone Company, 103 *S. W.* 714.

NEGLIGENCE TO PERMIT ELECTRIC WIRES CARRYING HEAVY CURRENT TO REMAIN UNINSULATED.

In an electric light company case in Texas the facts were that employes of the company had been engaged in repairing wires which were strung some distance below those of the Southwestern Telephone & Telegraph Company and so near to the telephone wires that employes of the latter ascending the telephone poles must necessarily come in close proximity to the electric wires. After completing certain repair work the electric company employes went away, on account of rain, and left the electric wires uninsulated. Later a lineman of the telephone company in ascending a telephone pole came in contact with these exposed electric wires and received injuries which caused his death. In a suit for damages against both companies the court of civil appeals has said: "A company maintaining electric wires, over which a high voltage of electricity is conveyed, rendering them highly dangerous to others, is under the duty of using the necessary care and prudence at places where others may have the right to go, either for work, business, or pleasure, to prevent injury. It is the duty of the company under such conditions to keep the wires perfectly insulated and it must exercise the utmost care to maintain them in this condition at such places. . . . The defective and dangerous condition of the wires in question, at a point where employes of the telephone company would in the course of their work be called, continued for months, until Badders met his death. The electric company says that it sent out competent men to repair the wires and put them in proper condition, including insulation, and these men reported the work done; that it had no notice to the contrary until Badders met his death. . . . If the duty was imposed on the company to exercise ordinary care with respect to maintaining its wires in a safe condition it was not error . . . to submit to the jury the question of its negligence in permitting such conditions to exist for so long a time, relying altogether on the report of its employes."

San Antonio Gas & Electric Company v. Badders et al., 103 *S. W.* 229.

BILL OF SALE OF TELEPHONE LINE DID NOT CONVEY ABSOLUTE TITLE.

In 1903 one Lattner and the Interstate Telephone Company of Dubuque county, Iowa, entered into an agreement whereby the company contracted to purchase the former's telephone system for a stated consideration. A bill of sale was delivered at the completion of the transaction, which provided among other things that it transferred to the purchaser "a line of telephone poles and wires . . . and rights of way for the maintenance of the line as now constructed and where the same is now constructed," and warranted that the "property was clear from all incumbrances," and that "the seller had a good and lawful authority to sell and convey the same," and further warranted the title thereto against the lawful claims of all persons. The supreme court of this state has held in a suit construing this contract that the instrument did not contemplate the conveyance of an absolute right of perpetual maintenance of the lines where constructed, but only the rights which the seller had at the time of the transfer.

Lattner v. Interstate Telephone Company, 112 *N. W.* 653.

COMPANY IN DIGGING HOLES INJURED SPRING OF WATER AND HELD LIABLE FOR DAMAGE.

An interesting case from the state of Delaware has recently been decided by the superior court in which the facts were that one Little was the owner of a farm over which the American Telephone & Telegraph Company had secured a right for a stated consideration to "construct, operate, and maintain its lines of telephone and telegraph including the necessary poles, wires and fixtures, upon, over and across the property which I own or in which I have any interest in the Mill Creek . . . with the right to permit the attachment of the wires . . . and to trim trees . . . to erect and set the necessary poles." In the work of setting poles the company found it necessary to use quantities of dynamite to facilitate the excavating. One of the explosions, according to Little's claim, injured a valuable spring of water near by and suit was brought for the resultant damage. The court said in deciding the case: "The crucial question before us is whether the possessor of a mere privilege or right of way in and over the land of another has the right to divert percolating waters, unnecessarily and negligently, from the lands of the owner to the injury of the owner . . . The exercise of the right conferred did not require the diversion of the waters or the destruction or impairment of the spring, unless the making of the hole with due care would have such effect. It was, therefore, a question for the jury to determine whether the spring was destroyed or impaired, to the injury of plaintiff, and, if it was, whether it was done by and through the negligence of the defendant company." The jury thought the damage to land by reason of the injury to the spring was $500. It will be noted that the liability was fixed on the company owing to the fact that it only had a permissive right of occupancy and not an absolute title to the land occupied. The point decided is an important one and companies in making contracts of this character may easily avail themselves of a position by which they will be fully protected by acquiring full title wherever such difficulties as the one in this case are liable to arise.

Little v. American Telephone & Telegraph Company, 67 *Atlantic* 168.

TELEPHONE POLES CONSTITUTE AN ADDITIONAL SERVITUDE IN ILLINOIS.

In a recent case the supreme court of this state has discussed this question and has decided that a line of telephone constitutes an additional servitude upon the fee in highways for which the owner of the fee may recover compensation. The DeKalb County Telephone Company, against whom the suit in this instance was brought, sought to distinguish between rural highways and city streets, but the court held that there is no distinction, saying: "There can be no doubt that under the law in this state, as heretofore announced, a long distance telephone line places an additional servitude upon the fee in a rural highway. It is contended, however, that there is a distinction in this regard between the use of a street in a city or village by a telephone company operating an ordinary local telephone exchange, and the use of a rural highway by a

telephone company operating a long distance telephone system. We are disposed to think that the attempted distinction is without any substantial basis. No reason has been given which could lead us to the conclusion that the telephone lines within the city are not an additional servitude, while holding that similar lines in the rural highway are additional servitude."

It was also contended that inasmuch as the city used the poles in this case for the conveyance of their fire alarm and police signal system no additional servitude was imposed. The court refused to accede to this, saying that inasmuch as the poles and wires of a telephone system in the street are an additional servitude, the use of the poles by the city for some purpose of the city, while they are still being used by the telephone company, would not lessen the burden.

De Kalb County Telephone Company v. Dutton, 81 *N. E.* 838.

ELECTRIC CABLE PULLER

An Ingenious Device Built by William M. Bailey, of Richmond, Indiana

By E. F. Strong

IN THESE days when good construction is essential to the success of any operating telephone company, many ingenious devices have been developed for doing work better and more cheaply. It has not been possible for managers of exchanges, who do their own construction work to have at their disposal all the labor and time saving devices, so it is often necessary to devise and build home made appliances, which oftentimes are not only practical and labor saving for the owners, but could be used to very good advantage in telephone construction work.

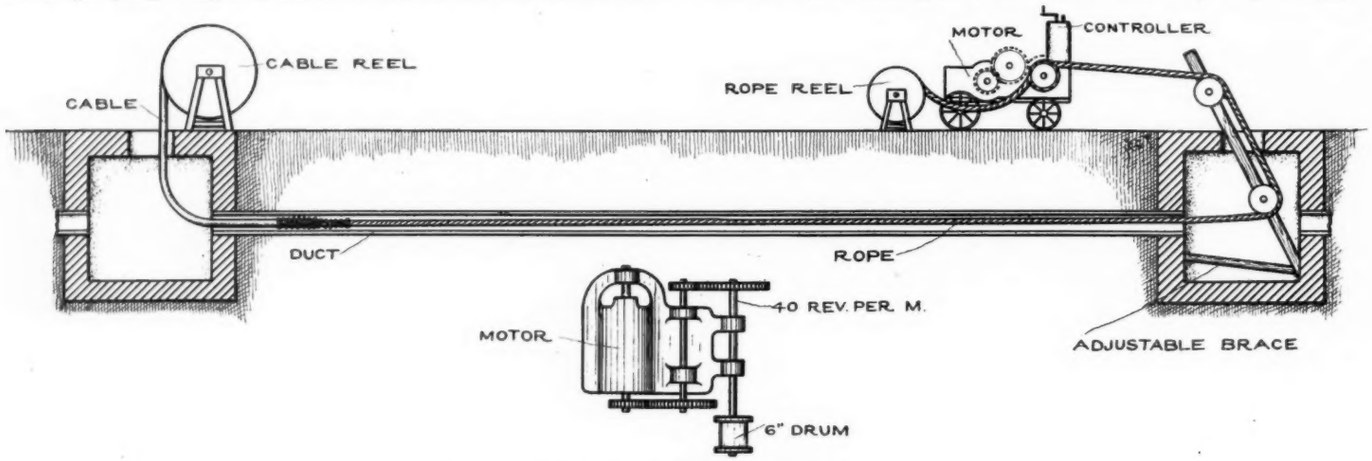
Electric Cable Puller Used at Richmond, Indiana. Mr. Bailey, Its Builder, Is Shown Standing by Cable Reel.

A device which has attracted considerable attention is a new cable puller built by William M. Bailey, general superintendent of the Richmond Home Telephone Company, Richmond, Indiana. This device, of which a photograph is shown, has done some remarkable work in the way of cable pulling. In building the device Mr. Bailey secured an old street car motor and mounted it on four wheels, so that it could be placed in any desirable position, a controller was added and the device was complete.

In the photograph the cable puller is shown in operation. Four or five turns of a rope are wound around the shaft, one end of the rope running through a snatch block, the other end being fastened to a tree or pole. The snatch block is fastened to the line or rope running through the duct in the usual way, the cable being pulled in at the rate of about sixty feet per minute. The pull is very steady and the machine is under absolute control at all times simply by slacking the rope on the shaft.

Mr. Bailey has recently finished pulling in about seven miles of underground cable for his company in record break-

ing time. In April he pulled in four thousand feet of cable for the Postal Telegraph Company in one day, which is said to be the best record ever made with a device of this kind. While the device has done very rapid and satisfactory work Mr. Bailey suggests some improvements as shown by the accompanying diagram, some of which are the substitution



Diagrams Showing an Improved Cable Puller.

of a five to ten horsepower 110 volt alternating current motor, and the gearing down of the machine so the drum will take from fifty to sixty feet of rope per minute. It would then be possible to place the motor at the hole to which the cable is being pulled and take the cable rope direct to the drum and then back on the rope reel, thus keeping the rope out of the dust or mud. The further suggestion is made that a one-half inch steel rope be used instead of a grass or hemp rope.

From the photograph and drawing a very clear idea of the device may be had.

PISTOL SHOTS BY TELEPHONE.

In the August TELEPHONY was reprinted a story entitled "The Mystery of the Murder at the Telephone," which hinged on the fact that a pistol shot was heard over the telephone, giving rise to the theory that a murder had been committed. A somewhat parallel case in real life is reported from Lowell, Mass., where, while listening over the telephone to her appeal for aid, Bernard J. Gately, a constable, heard Mrs. Mary McBride, a milliner, scream and then a shot, and a moment later heard Mrs. McBride fall. Gately, paralyzed for a moment at the sounds over the wire, rushed quickly to the woman's store. He found Mrs. McBride lying unconscious, with a bullet wound over her right eye.

In one corner was Miss Vanasse, the milliner's assistant, half fainting from her experience. She told the constable the shooting was done by John Kelley, who was madly in love with the woman. Kelley was found near the scene of the shooting and arrested.

Mrs. McBride was taken to the hospital in a dying condition.

A similar case, although involving an attempted suicide, is reported from Pine Bluffs, Ark. After she had repeatedly spurned his love, T. M. Leibig, a young druggist of that city, telephoned Miss Pauline Rogers and, after being refused an interview, declared he would kill himself.

"I don't want to talk to you," she said and hung up the receiver. Leibig was persistent. He had previously visited the young woman but was refused admittance. Later he called her by telephone and a second and third time he called her.

When she finally consented to talk with him he told her she would soon hear something she would regret all her life.

"What is that?" she inquired.

"Well, listen," came over the wire, and the young woman almost fainted when she heard the report of a revolver. Then all was still.

She immediately notified the police and when Chief Parnell went to Leibig's room he found the young druggist apparently dying. Physicians, however, declared Leibig would recover.

THIS IS ON W. H. HEMPHILL.

Friends of W. H. Hemphill, secretary of the Topeka (Kan.) Independent Telephone Company, are telling a story on him which is related by a Topeka newspaper as follows:

W. H. Hemphill, secretary of the Independent company, is likely to blush if he ever meets a Topeka woman with whom he exchanged a few words over the telephone a few days ago. A male friend of Hemphill's is unusually bow-legged and has to stand for lots of joshing on this account. Some time ago he ordered a telephone put in at his home, but the company was some time in getting around to fill his order. In the meantime he averaged about two calls a day for Mr. Hemphill to ask when he could expect his telephone. One day the switchboard operator in the Independent company's business office said this same man was asking about his telephone again. Mr. Hemphill told the operator to tell him that it would be a day or two longer. At the same time the operator plugged in on Mr. Hemphill's desk telephone and he supposed it was the same call that he had told the operator to answer.

"Hello, how is my bow-legged friend to-day?" Mr. Hemphill asked in a familiar tone, supposing it was the man he was talking to.

From the other end of the line came a deathly silence, a gasp and then a shriek of laughter.

"Not guilty—I guess you've got the wrong number," came over the wire in unmistakably feminine tones, and then the receiver went up to the accompaniment of more peals of laughter. Now Mr. Hemphill is wondering to whom he was talking.

Miss Irene West, a "hello girl" employed by the Pioneer Telephone Company at Muskogee, I. T., this city, has fallen heir to a fortune of $500,000. Years ago her father lived in Texas, and was an extensive ranch owner. He got into a legal tangle over the title to his lands and lost in the lower court. The decision made him penniless. He took his family to Arkansas, and later moved to Muskogee, where old and broken down, he earned a scant living as a day laborer. He died last year, and the daughter has since supported herself, earning $7 a week at the telephone switchboard.

BANKING POLES

The Many Advantages of Protecting Poles in This Way Are Pointed Out

By G. F. Hardwicke

ALL MINOR efforts of public service corporations tend toward the final result of paying dividends to the stockholders. To this end the proper construction of a corporation's property with the view of least expense for maintenance and the maintenance of the property by methods which, in themselves reduce the cost of maintenance, are subjects of vital importance to the final result. It is with one of these minor matters, the banking of telephone and telegraph poles that this article will deal.

Poles of any material, full size cedar, sawed fir or red wood or even those of metal deteriorate more rapidly at the point where the moisture in the surrounding earth meets with a relatively free circulation of air, both elements being essential to rapid deterioration. If, by some means this point may be shifted throughout a space of a foot or more during each year of the life of the pole, instead of the full effect of corrosion being concentrated in a space of two or three inches of the pole's length all of the time, the weakest part will be protected and be made to support its load much nearer the natural life term of the balance of the pole.

A bank of earth, eighteen inches to two feet high around the base of a pole will under ordinary circumstances gradually be worn down to somewhere near the level of the surrounding earth in from six months to a year, thus producing just such desirable conditions.

It is evidently an advantage to prevent as far as possible an accumulation of moisture near the pole. In all sorts of earth the act of digging a hole, thus loosening up each shovel-full and to some extent pulverizing it, brings it to such a condition that when again shoveled into the hole, and with as much tamping as is justified, it will still settle more or less for a long time. Unless a bank of some proportions is provided, this settling produces a depression in which each rain leaves an accumulation of water to gradually evaporate or filter away. A heavy bank not only prevents this accumulation but acts as a water shed to keep the earth below it dry.

A heavy bank serves also to strengthen the pole to an extent greater than appears possible at first thought. In every pole line there is some tendency to vibration from natural causes but the additional load coming from wind and sleet storms places upon the poles at the point of entrance into the ground an extra strain. If this strain can be distributed through even a small part of the length of the pole rather than at the surface of the solid earth it will often be safely carried where otherwise a break would occur. A heavy bank will give gradually to the side strain, the greatest displacement beginning at the top and gradually diminishing to the base. The building of a bank also slightly lessens the breakable length of the pole, that is, the length from the top arm or other attachment to the earth and that without lowering the wires or cables carried by it.

In all parts of the country toll telephone and telegraph lines are usually built where no effort is made to prevent the promiscuous growth of vegetation. In the fall of the year when the vegetation dies and dries out the dangers to service through poles being burned begins and continues until the new growth covers up the old in the spring. This is especially true where leads are built upon or near railroad right-of-way.

The banking of the poles not only prevents the ready growth of vegetation up against the poles but also serves to protect their butts from igniting if the flames reach them. It is a fact that the sap of any full size pole except it be torn or frayed by rotting will not ignite quickly so that an intense flame might pass by a pole with a whole sap surface without danger to the pole.

It has been found by continued practice that under ordinary conditions a bank eighteen inches high at the crest is high enough and that to build it lower would not be justified by any difference in expense. In the construction of a standard lead, eighteen inch banks can be built at an average cost of from four and one-half to five cents each. In the annual or semi-annual overhauling of pole leads where very little hole digging or resetting of poles is done the cost of constructing banks will run from five and one-half to seven cents each.

The replacing of one pole burned out of a lead will pay for a large amount of pole-banking without taking into consideration the loss caused by interrupted service.

The following items represent a fair average of such an expense on a twenty-five foot lead carrying one standard arm of wires:

1 25 foot pole	$3.00
1 standard arm, fitted complete	1.15
Miscellaneous material	.50
Hauling material, tools and lineman, average distance of six miles and back	3.50
Time of lineman one day	2.50
One meal for lineman, team and driver	1.40
Total	$12.05

The cost of replacing a pole in a lead carrying more than one arm of wires is, necessarily, greater in proportion to the load and the loss caused by interrupted service is also correspondingly greater.

Twelve dollars and five cents will pay for the banking of 241 poles or 6.7 miles of 36 poles to the mile if done during the construction of the lead. It will pay for the banking of 185 poles or 5.14 miles of 36 poles to the mile if done during the annual or semi-annual overhauling of the lines.

It has been found that in a certain territory containing approximately five thousand miles of toll pole line on which very little banking had been done, about equally divided as regards public road and railroad right-of-way and in which the diversity of topographic conditions make it a good location from which to judge others, the proportion of poles burned each year is about one in one thousand. If the cost of replacing poles burned were the only item to be considered to offset the advantage of banking it would, therefore, be somewhat cheaper to replace the poles so burned than to bank all of them. Nor is it claimed that proper and systematic banking is a sure preventive against burning but the claim is made that, at least, seventy-five per cent of the ordinary destruction so caused may be prevented.

Add to the saving of expense on account of non-destruction by fire, that accomplished through uninterrupted service conditions and this alone will well repay the cost of systematic banking of all toll poles. In addition to this and probably of far greater importance in the end is the extension of the life of the poles and the strengthening, to a certain extent, at least, of the lead as a whole.

MANUFACTURERS DEPARTMENT

MODERN EXTENSION STATION EQUIPMENT.

Several months ago the hand telephone equipment for main station service manufactured by the Wire & Telephone Company of America, Rome, New York, known as the Easophone, was described in this paper. The adoption of this equipment created a demand for a similar equipment for extension station service. To meet this demand the equipment as illustrated in the accompanying pages was designed, and it has been placed upon the market by the

Figure 1—Telephoning with the Easophone.

company. In a comparatively short time a demand has been created for it in offices, factories, hotels, residences and in railway work where telephones have not heretofore been generally used to the extent conditions justified. The hand telephone, although it had been in use abroad and to some extent in the United States for a few years, was not heretofore generally adopted owing to its fragile construction and limitations for long-distance service. The instrument, as described and illustrated, overcomes these objections, and is so constructed as to be practically indestructible, giving no trouble to the user, and greatly reducing the maintenance cost to the operating company or the owner of a private branch exchange system.

In residences, the bellbox, either with or without the hand instrument, is placed in the reception hall or some other centrally located room from which the bell can be heard in the other rooms where the switch-hook boxes, each with its hand instrument, are located. In the bedrooms these are usually on the wall at the head of the bed, so that the person in answering or calling need only take the instrument from the hook, which is usually within reach. In case of emergency, such as when one wishes to communicate with the police, fire department or doctor, this service is of great value. In the living room, den, drawing room, etc., the space occupied by the box and instrument is so small and it is so attractive in appearance that no objection exists to its installation, and that one need not leave the room for telephone service is a fact that meets with great favor. In many homes, from two or three to as many as seven or eight, extension equipments are in service. In offices the box is usually placed under the desk or in some out-of-the-way location, since it need not be accessible, as it does not get out of order, nor does the ringer need adjustment. The switch-hook box can be placed on either side of the desk, or inside a roll-top desk, or on the side of a table. Figure 1 shows how convenient and attractive the equipment is, as compared with the old style, see Figure 2, and the fact that persons need not, as is the case with the ordinary desk set, bring the heavy standard to them or go to it, and how it saves time and energy. The breaking of parts in the standard equipment is due in a great many instances to its being knocked off the table or desk. This cannot be the case with the Easophone, for when not in use it hangs securely on the hook provided. From the detailed description it is readily seen that the equipment is practically indestructible, and is more efficient for long-distance service than the ordinary type because of the length of the horseshoe magnet, which forms the frame. This in turn is embedded in hard rubber.

The transmitter, as shown by Figure 3, is of the most advanced and efficient type, the vibrating diaphragm of which has encased the front and rear electrodes and the carbon granulars, insuring a perfect freedom of action among the particles whenever the transmitter is in use, and prevents the transmitter from packing. The solid tripod bridge threaded on the outside permits the piston chamber to be both concentric with the rear electrode piston and perpendicular to the frame of the diaphragm. The large number of screws usually used in transmitter construction are eliminated, and the transmitter, as can be seen from the cut, is correspondingly simplified, and conforms to the narrow limitations so essential in the well-balanced telephone. The hard-rubber mouthpiece is fixed to a knurled

Figure 2—Telephoning with a Desk Set.

ring by means of a friction ring, and although it can be rotated will not fall out.

The receiver, as illustrated by Figure 4, is comprised of a long, powerful high-grade, permanent horseshoe magnet, extending from the earpiece to the transmitter end of the instrument, being molded and solidly encased in vulcanized hard rubber, and riveted at the ear end to the supporting hook and to the Norway iron electro-magnet core, over all of which is formed a solid molded covering of hard rubber. The slip coils are placed upon the electro-magnet cores, these are held rigidly in position by German silver plates. Two connecting screws in the receiver cup are provided

for attaching the flexible silk cord and conductor directly to the receiver coil. This direct connection is made possible by a channel through the molded handle between the arms of the horseshoe magnet, and extending directly into the receiver case. This construction provides a magnetic field of high intensity at the pole base of the receiver magnet, and affords a superior receiver for long-distance use. The horseshoe magnet at the neutral point, or heel, is circular in form and permits the transmitter cup to pass through the opening thus made, and by means of a clamp nut is permanently locked to the steel backbone of the instrument. The clamp nut is covered, for the purpose of finish, with a hard-rubber screw cap, and this provides a solid backing for the transmitter front which encloses the diaphragm.

The bellbox, which is handsome in appearance, is formed from one piece of cold-rolled sheet steel. The box is treated to repeated coatings of baked japanned enamel, which gives it a highly polished finish. It contains the ringer movement, bell, induction coil, connection strips and the condenser. The Potter single-coil ringer movement is not only compact but highly efficient. It is of substantial construction and

Figure 3—Transmitter Dissected.

Figure 4—Receiver Dissected.

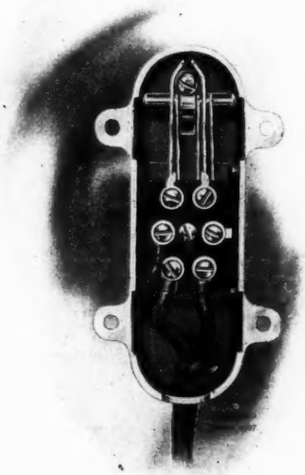


Figure 5—Switch Hook Box.

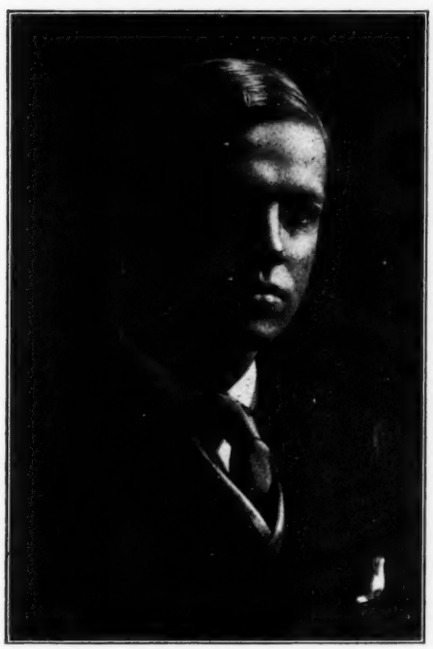
when assembled the coils are surrounded by the heavy horseshoe magnet, and thus protected on all sides against blows from which might result mechanical injury. The ringer movement is self-contained, and can be assembled and tested before being mounted in the box and fixed in permanent position, which is done by means of two screws, no solder or other means of connection being necessary. The movement consists principally of a wire helix, a permanent horseshoe magnet, and a vibrating arm freely operating within the helix and in the powerful magnetic field between the pole faces. No adjustment to the armature is necessary. The induction coil in the bellbox is held rigidly in position by springs and when unsoldered from the wire form is readily removed. The condenser is of two microfarad capacity, small and compact with nickel-plated brass cone terminals. These cones are so located and so constructed as to engage with two spring condenser connecting plates, mounted upon and insulated from the steel boxes, the plates themselves being soldered to the wiring form. The condenser is rigidly held in position by means of these two plates, and an auxiliary heavy supporting spring located at the opposite end of the box. It may be removed at will, but it is impossible for it to be jarred from its proper position. In taking the condenser to or from the box no tools or solder is necessary.

The extension switch-hook box, as shown by Figure 5, is stamped from sheet steel, and provided with flanges for mounting same. The box is finished either in nickel or black enamel and is very attractive in appearance. A single metal stamped bracket is provided for assembling and holding in fixed position the entire actuating mechanism. The spring connecting plates and the hook and working parts are held in place within the box by a single screw, and all parts may be readily removed. By the use of the inturned contact springs, acting upon the hard-rubber roll placed upon the supporting or actuating hook, the use of auxiliary springs is made unnecessary. All contact springs are provided with platinum points. An insulating plate with brass lugs molded thereon is provided for direct connection to the flexible silk connector cord, stamped springs and plates provide all necessary means of connection, and there is thus afforded the necessary direct connection for any telephone circuit. The construction of all parts is of such a substantial character, and the parts are so reduced in number and so assembled that maintenance troubles cannot exist.

The Wire & Telephone Company of America has since the erection of its new buildings materially increased its manufacturing capacity, and is making deliveries of this apparatus in a manner that meets satisfactorily a rapidly increasing demand.

DEAN ADVERTISING MANAGER.

Fred A. Cornell, the new advertising manager for the Dean Electric Company, of Elyria, Ohio, gained his telephone experience with the Columbus (Ohio) Citizens' Telephone Company and with the Western Electric Company of New York. While with the latter concern, he edited a small monthly sheet, "The Bulletin," which was distributed at the company's expense for the confidential information of the employes only. This work, together with a general newspaper experience along with his college course at the Ohio State University, fits him for publicity work and should enable him to maintain the high standard of advertising already established by the Dean company.



Fred A. Cornell,
Advertising Manager Dean Electric Company.

Mr. Cornell brings to his new work an enthusiasm and a faith in the continued success of the company which are certain to bring results. His connection with the Dean is expected to prove valuable to both.

MORE POPULARITY FOR MILLER ANCHORS.

The Miller Anchor Company, of Norwalk, O., has just received notice that the Washington, Baltimore & Annapolis Electric Railway Company has decided to use 2,800 of the Miller safety anchors along its right of way between Baltimore and Washington. Some two months ago

the Roberts & Abbott Company, of Cleveland, O., engineers in charge of the construction of this electric railway, made a very thorough test of four different makes of anchors in the sand and clay along this line, and, after very careful consideration of all the anchors tested, decided to use the Miller safety anchor. The Chicago & Milwaukee Electric Railway Company also has just placed orders for 2,000 of the No. 3 anchors, which "never pull up."

IMPROVEMENT IN LIGHTNING ARRESTERS.

The Holtzer-Cabot Electric Company, of Chicago, Ill., and Brookline, Mass., is placing upon the market a new and improved type of a lightning arrester. The need of a reliable arrester that can be mounted on a telephone or placed on the line that comes into the building has never been adequately supplied, it is said, consequently this arrester was developed having in view these requirements. This arrester, as a view of the cut will show, is very compact, being only three and three-eighths inches long, two and one-quarter inches wide and one and three-eighths inches high. It is covered with a removable glass top which protects every live wire. The construction is such that it can be mounted on the top of a telephone, or used as a main line arrester outside of the building in a protected place.

The theory upon which it depends for its arresting qualities is based on the well-known fact that lightning will jump across an air space to an adjacent ground rather than

Holtzer-Cabot Improved Lightning Arrester.

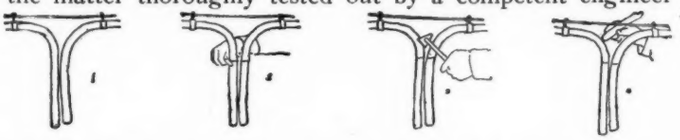
traverse even one complete circle of wire, consequently it will be noted, by viewing the cut, that the two cylinders of lava are wound with about twenty turns of wire, and the peripheries of the coils are placed parallel and adjacent to a cylinder of carbon that is grounded. It is found in practice that any high potential current, on account of the choking effect of the coils, continually creeps and sputteringly discharges itself to ground. This action takes place along the peripheries of the first four or five turns of wire on the incoming current end of the arrester.

From a mechanical standpoint, also, this arrester is very intelligently worked out. It will be seen by referring to the illustration that the coils and the carbon rod not only are capable of being rotated, and thus exposing new surfaces, but that they can be instantly removed and new ones inserted if that should become necessary. The arrester is made up entirely of non-inflammable material, namely, the base of porcelain, spools of lava, and cover of glass. In this connection, it should be noted that when these arresters are placed on the top of the telephone, which is generally the housewife's cupboard for scissors, spectacles, etc, the glass cover absolutely protects every live wire from a ground or a short.

The second important feature of this arrester, after its reliable lightning arresting qualities, is the fact that it is self-clearing. This is due to the fact that the space below the nearest point between the peripheries of the coils and the periphery of the carbon rod continually grow larger, and consequently no disintegrated carbon dust can stick, but drops below. This arrester contains such new and favorable features that it should meet with deserving success.

MOISTURE-PROOF OR NOT MOISTURE-PROOF?

The Hargis joint has now been upon the market more than a year. The most natural question that would arise in the mind of most telephone men would be, "Is it moisture-proof?" The manufacturers have heard this question a number of times in the past year and decided to have the matter thoroughly tested out by a competent engineer

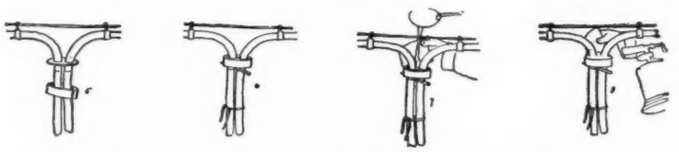


whose opinion would be of value to telephone men in general. To this end they employed Mr. Kempster B. Miller to make exhaustive tests and to render them a report of his findings.

Mr. Miller's report dated July 3, 1907, is as follows:

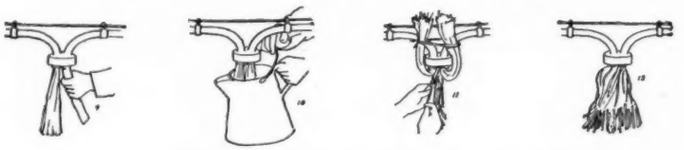
"I have tested the one hundred pair cable splice made with the Hargis splicing joint to ascertain its moisture-resisting properties.

"This splice between two one hundred pair cables was in

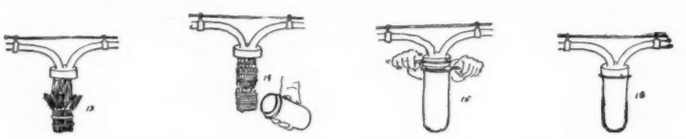


my presence, the cables were lead covered, having twenty-two gauge conductors with a single paper wrapping. The wire joints in the splice were covered with ordinary paper sleeves, and the splice was afterward boiled out in paraffin in the ordinary manner.

"Twenty-four hours after making the splice the lead sheath on each cable was cut back for a few inches to expose the conductors for test. The insulation resistance of the



various wires was then measured, each wire being measured against all the others and the sheath. The average resistance of each wire with respect to all the others in the sheath was approximately 20,000 megohms. The joint was then completely immersed in water, the water extending up on the cables several inches above the splice. In order that the cable conductors protruding from each end of the lead sheath might not have their insulation altered by the possible



presence of water vapor, each end was carefully protected by soft sheet rubber, completely enclosing the ends and bound tightly against the sheath.

"After submersion in this manner for fours days the insulation resistance was again measured and found to have changed in no substantial degree. Some differences were noted in the measurements, but in each of these cases the insulation resistance was somewhat higher than that previously noted.

"The joint was again put to soak for two days more, mak-

ing a total of six days, after which insulation measurements were again made, the readings being substantially the same as before.

"The splice was then opened by unscrewing the protecting lead sleeve or hood and no traces whatever of moisture could be found within it. In order to prove that the presence of moisture within the sleeve would effect the insulation resistance even though it did not touch the conductors or their insulation, a very small amount of water was placed within the sleeve which was again screwed in place and held in such position that the water could not come in contact with the conductors or their insulation. After standing in this position for twelve hours, the insulation resistance of the various wires was measured and was found to have decreased to about one-tenth of its former value.

"The single wiped joint through which the cables enter the splice is, I believe, of such a nature as to be less subject to faults than are the two wiped joints in a splice constructed by the method now in vogue. The wiped joint in the Hargis splice is virtually a poured joint, the making of which would seem to be within the skill of an intelligent workman after a little practice. I believe that the danger of moisture leaking through the wiped joint on the Hargis splice is less than that of its leaking through the two wiped joints of the ordinary splice.

"I have given careful thought to the matter of the moisture resisting properties of the rubber gasket upon which the screw-threaded part of the protecting hood or sleeve seats when screwed into place. As this gasket is practically protected from light, air and moisture, I believe that the life of the rubber would be retained for many years. Its renewal, if it were found to deteriorate after a period of years, could be made at slight expense. As this gasket occupies a space between two turned brass surfaces, there seems to be no question as to the reliability of this portion of the joint, if care is taken to properly seat the gasket.

"From these tests, together with a careful study of this cable splice from all points of view, I conclude that the Hargis joint, if made with a reasonable amount of care, is water tight and may be counted upon as remaining throughout long periods of time."

The little line drawings used in connection with this article were furnished by the manufacturers to show the successive steps in the operation of making the Hargis joint moisture-proof.

EXPANSION OF THE PREMIER ELECTRIC COMPANY.

The Premier Electric Company, Chicago, which was organized something over two years ago to succeed the McDermid Manufacturing Company, and which some months ago altered its plans so as to include a general supply business, has recently made further business extensions, having bought out the stock, equipment and good-will of the Bigley Telephone Company. Both the Premier Electric Company and the Bigley Telephone Company have been active factors in the telephone field and have made many friends and customers. The latter concern has engaged chiefly in the re-construction of telephone apparatus and the manufacture of a special telephone of popular design, styled "the Bigley special." Under the consolidation effected by the Premier Electric Company, the scope of the new concern's operations will comprise not only telephone cords (prominent among which is the "Premier B. B."), but will include cable trolleys, telephone signs, rubber covered wire and exchange supplies of every description. Also, new capital and energetic business methods will infuse new life and vigor into the operation of the telephone department, proper. The concern will continue to specialize in the rebuilding of telephone equipment, handling only material of approved makes and reliability, all of which will be carefully gone over and tested before shipped so as to make it virtually as good as new. Special attention will also be given to repair work of all kinds for telephone companies. Aside from the rebuilt apparatus, the Premier Electric Company will handle new telephone equipment and will be prepared to furnish parts of every description necessary for telephone work.

The company has now ready for mailing a new bulletin much larger and more complete than any previous issues. This contains net prices on new and rebuilt goods.

Since acquiring the business of the Bigley Telephone Company, the Premier Electric Company has moved from 141 South Clinton street, Chicago, to 56 and 58 West Van Buren street, where it has three floors devoted to its purposes and enjoys ample facilities for handling business on a large scale.

W. J. Burton, who is president of the Premier Electric

W. J. Burton.

J. W. Bigley.

Company, is well known to many of TELEPHONY's readers, as is also J. W. Bigley, vice president. J. E. Crawford, a prominent Chicago business man, is the firm's secretary and treasurer.

THREE GOOD TELEPHONE SPECIALTIES.

The American cable clip has been adopted by the New York Central & Hudson River Railroad Company as the easiest to apply and the only one that can be removed without mutilation and which may be used repeatedly. It conforms to all the standards required for a first-class cable hanger. The cost of putting it on is a considerable factor of saving, as it is claimed twice as many can be put on in a given time as of any other make. The price is no higher than for inferior clips. No specially trained workmen are required and any lineman can put them up.

The Simplex ground connector is made of a piece of tinned copper, one and a half inches square, having four eyelets in the corners for the purpose of passing two pieces of iron wire around a pipe of any diameter and drawing the connector into close and perfect contact with the ground pipe. It also has a tubular opening for inserting the ground wire, which can be conveniently soldered, if desired. It is said to be the only ground connector which can be taped over and properly protected from the influence of the air, etc.

The Economic pole cable switch is said to be the only device of its kind on the market. It is portable and is claimed does the work of a man on each pole while erecting the cable with the temporary "S" hooks. It is made substantially of steel, and will stand the roughest usage.

All three of above specialties are made and for sale by the American Cable Clip Company, 132 Prince street, New York city.

TRADE NOTES.

H. B. CAMP COMPANY has issued a large and tasteful card folder illustrative of the use of its clay conduits at Charleroi, Belgium, on a handsome thoroughfare.

THE MASSACHUSETTS CHEMICAL COMPANY has issued a loose-leaf catalogue and price list of insulating materials, including liquids and compounds, tapes and molded rubber goods.

THE WESTERN INSULATED WIRE COMPANY will remove soon to a fine new reinforced concrete building which is being erected for its purposes at Hart and Kinzie streets, Chicago.

THE NEW FIRM of Geo. H. Erich & Company has taken over all the business interests formerly conducted by Mr. Erich at 358 Dearborn street, which will continue as the firm's location.

HARRY FORD, representing the Haeusermann Metal Company, is now located in his new office, 1101 Masonic Temple, Chicago. He will be glad to receive inquiries regarding name plates.

ANDERSON FORGE AND MACHINE COMPANY, Detroit, Michigan, is placing on the market an improved pole raising wagon by the use of which, it claims, a large saving is effected in the cost of pole setting.

THE AMERICAN CONDUIT COMPANY, New York, Chicago and Los Angeles, is mailing out a series of interesting post cards. One of the latest treats of "Cement Testing for Small Purchasers." Write for this and for the company's charts, giving cost of concrete.

ROTH BROTHERS & COMPANY, manufacturers of dynamos, motors and special electrical machinery, with headquarters in Chicago, have opened an office at the Electrical Exchange building, 136 Liberty street, New York, with George F. Schminke as manager.

THE AMERICAN ELECTRIC FUSE COMPANY, Muskegon, Mich., and New York, is putting out an attractive line of literature relating to its enclosed fuses, joints, switches and station protectors for out-of-door use at subscriber's end of the line. Honest and efficient workmanship is claimed for all of these specialties in the highest degree, and telephone men who are interested in such apparatus are invited to send their addresses for literature covering same.

THE 1907 CATALOGUE of the Leeds & Northrup Company, Philadelphia, Pa., is a neatly prepared 125-page publication, giving not only excellent illustrated descriptions of its various lines of instruments, but also an outline of the factory in which the instruments are built and tested. The catalogue contains much valuable information concerning the operating characteristics and the relative advantages and disadvantages of the numerous testing instruments for certain duties.

BESIDES MANUFACTURING "ARMALAC," the plastic insulating compound, the Massachusetts Chemical Company, Walpole, Mass., is the largest manufacturer of friction tapes and splicing compounds for all grades of work in the world. The company guarantees its tape to be of high insulation qualities and not to dry out, and it sticks. The compound does not deteriorate the cloth, it being always of great strength with a big yardage to the pound.

FRANK B. COOK invites telephone men to investigate his No. 20 switchboard protector which is fully described in some of his new printed matter. Mr. Cook would also like to mail to all parties, interested in such apparatus, his circular, entitled "Four Recent Legal Decisions Covering Self-Soldering Heat Coil Protectors."

THE F. BISSELL COMPANY, Toledo, Ohio, has issued a circular entitled "The King Pin," which sets forth the advantages of the locust pin. A table is given of tests made by the forest service of the United States department of agriculture, showing that the locust pin is much superior in strength to oak, elm and birch pins tested in comparison.

THE INTERNATIONAL TELEPHONE MANUFACTURING COMPANY, Chicago, reports a large demand for its transmitters and receivers for use in connection with transmitting phonograph music, lectures, church service, concerts, etc., over telephone lines. It is said that the "International" instrument is well adapted for such work where it is necessary to have from twelve to fifteen batteries on the transmitter, though it requires but one cell of battery for long-distance telephone service.

C. S. KNOWLES, 7 Arch street, Boston, has recently issued two new catalogues on insulators; one (Catalogue No. 50), covering standard glass insulators and porcelain wiring knobs, cleats, etc., of interest to telephone and electric light companies; the other (Catalogue No. 51), covering glass and porcelain insulators for high-voltage work, and also insulator pins and pole hardware in general. Catalogue No. 51 shows porcelain insulators for voltages from 4,000 to 75,000. Either or both catalogues will be sent on request.

THE NATIONAL SALES COMPANY, of Omaha, Neb., has been incorporated with a capital of $15,000 by W. D. Crist, J. F. Munro and others for the purpose of acting as manufacturers' agents. Mr. Munro, who was formerly with the Nebraska Electric Company, of Omaha, has been appointed vice president and general manager and Mr. Crist, secretary and treasurer. The concern will make a vigorous campaign for business in its territory and seeks desirable accounts with Eastern concerns manufacturing for the telephone and electrical fields.

THE DURANT ELECTRIC SUPPLIES COMPANY, Chicago, reports extensive sales of its "Ironite" duplex drop wire, the economical substitute for copper. It is claimed that "Ironite" costs 25 per cent less than duplex copper wire, is twice as strong, will not stretch, is perfectly flexible, will not break inside the insulation, has the best grade of insulation and is guaranteed to meet the standard insulation tests. It is made in three sizes—Nos. 14, 16 and 18, B. W. G. In short "Ironite" is claimed to be the ideal duplex drop wire and it sells at a very low price.

THE DOUBLEDAY-HILL ELECTRIC COMPANY, Pittsburgh, Pa., advises that its Charlotte, N. C., warehouse is now open, and ready to take care of requisitions for the southern trade. Its stock is large and comprehensive, covering the best lines of material, such as "O. K." weatherproof wire, and "Parac" rubber covered wire, Bryant, Perkins

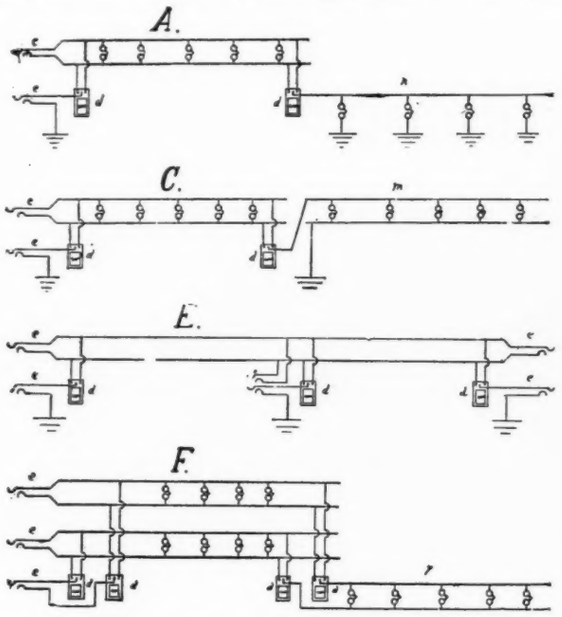
and Paiste materials, Emerson alternating current desk and ceiling fans, "Peerless" lamps, Hubbell specialties, etc. From this stock the demands of lighting stations, electrical contractors, street railway companies, and telephone companies can be promptly supplied.

THE SWEDISH-AMERICAN TELEPHONE COMPANY, Chicago, Sioux Falls and Kansas City, has recently secured the contract for the entire equipment to be furnished to the Citizens Telephone Company, of Horton, Kan. This contract was secured through the Kansas City branch, now in charge of C. R. White. In this connection the Swedish-American company reports that business from its Kansas City branch is better than ever before. A number of large contracts are being secured and many instruments are being sent daily to its large list of old and satisfied customers in that territory.

The Swedish-American Telephone Company has recently secured the contract placed by the Cass County Telephone Company, of Dowagiac, Mich., for five hundred telephones. The Cass County company is one of the newer Independent companies in Michigan and expects to cover two or three counties in the southern part of the state.

POLE CHANGERS AND DUPLEX SETS.

The Standard pole changers and duplex sets, manufactured by the Current Electric Company, Chicago, continue to win their way in the telephone field. Neatness, efficiency and price are three very strong points in these specialties.



The entire mechanism of the pole changer is built on the inside of a highly finished quarter-sawed oak case with the binding posts and switchboard on the outside. To observe the interior one has simply to turn it over; there is no glass to remove or get broken. It will work in all positions. Dimensions are 6x8x4 inches; weighs 3½ pounds.

It is claimed by the manufacturer to be economical and convenient, as it takes but one battery to operate it.

Its present price is but $15, and it will be sent on thirty days' trial to all responsible parties.

Standard duplex sets, which also sell for $15, are made for, and extensively used on, metallic bridging lines, metallic toll lines, trunking lines, etc., as they render one or more additional talking and ringing circuits, according to the original number of circuits and the number of instruments used, without cross-talk or disturbance to the original lines. The company claims that they are simple, inexpensive, easy to connect, have no movable parts or contacts to wear out or get out of order and are well protected by lightning arresters.

Figure A represents an extension or branch line which may be connected anywhere on the metallic circuit or if connected to any single party along the line will render him private service.

Figure C illustrates an overloaded metallic line divided.

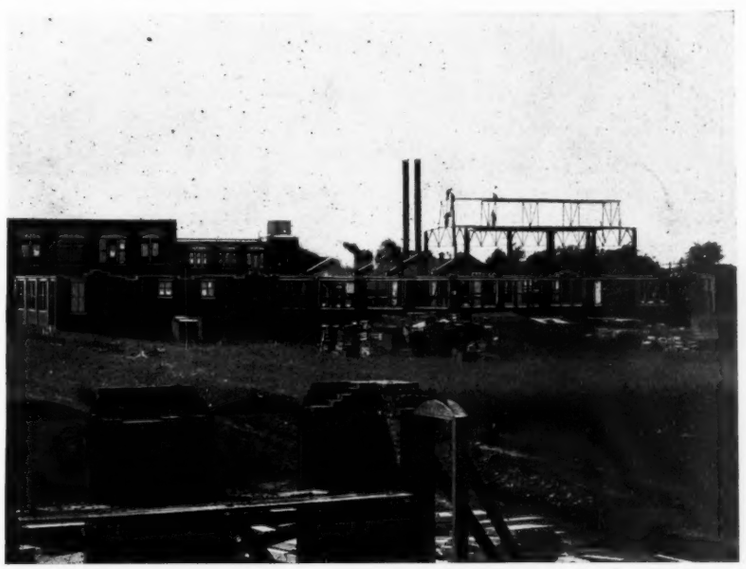
Figure E shows an extra duplex circuit for three toll stations, with one and one-half duplex sets.

Figure F shows an extra metallic circuit obtained by the use of two Standard duplex sets.

DEAN COMPANY'S NEW PLANT.

The accompanying reproduction illustrates a corner of the Dean Electric company's plant at Elyria, Ohio, and shows the new buildings under construction that will, upon completion, double the company's manufacturing facilities. Parts of the new three story buildings are shown and also the superstructure for one half of the new power house. The large building in the center will, alone, provide over 50,000 square feet of floor space. Ample room for further building is provided, as shown in the middle ground, this being a part of the five acres at present unoccupied.

The complete power plant will include an installation of Babcock & Wilcox boilers, providing steam for generating 600 horse power by means of Crocker-Wilcox generators, direct-coupled to Ball & Wood vertical engines. The plant is capable of large overloads and includes enough floor space



New Building, Dean Electric Company, Elyria, Ohio.

to double the initial equipment. Such extension will be made as rapidly as the load is increased.

The manufacturing machines will be operated by individual, direct-drive motors, thereby effecting obvious economies. The newest and most efficient equipment will be installed in the new buildings and overcrowded departments in the older sections will be relieved and modernized. The factory force is being increased as rapidly as the new departments are ready for occupancy.

CRACRAFT-LEICH ELECTRIC COMPANY.

Official announcement is made that the Eureka Electric Company has sold its plant and business to the Cracraft-Leich Electric Company. The gentlemen composing the new company are popular and experienced telephone men, formerly connected with the Stromberg-Carlson Telephone Manufacturing Company and the American Electric Tele-

phone Company. They will start with ample capital and we bespeak for them success.

MONARCH TELEPHONE COMPANY'S NEW FACTORY.

The accompanying illustration shows the new factory soon to be occupied by the Monarch Telephone Manufacturing Company. This building is at the corner of Washington boulevard and Morgan street, Chicago, just eight blocks west of the present quarters of the company at 12 South Clinton street. As will be seen, the new building is nearing completion and it is expected that the Monarch company will move into it about the first of October. For several months past the move has been contemplated and a large quantity of stock has been worked up so that no delays in shipments will be experienced during the moving and settling period. While the growth of the Monarch company has been rapid heretofore, the doubling of floor space and manufacturing facilities, now being effected, will undoubtedly bring about an even more phenomenal increase in

Monarch Telephone Manufacturing Company's New Building.

business. At the same time, the factory has not yet reached that size where the efforts and supervision of the individuals in charge are buried too deep under the mass of business to be shown in the apparatus produced and to be felt by the customers of the company. The feature of personal attention to all details will be preserved, as it is due largely to this feature that the success of the Monarch company has been so great.

SHIPPING APPARATUS TO INDIA.

It is difficult to design anything new in the style of telephone apparatus any more. This, however, appears to have been accomplished by the Western Telephone Manufacturing Company, Chicago, in its "Ideal" telephone. This instrument, while designed for a class by itself, will be recognized as of the common battery type of local battery telephone. It is neater and more compact than any other make of telephone of this type, and is unique not only in the design of the cabinet but in the arrangement of the apparatus inside and in the wiring. The different parts are so installed that the generator, ringer and induction coil can be removed by the use of a screw driver only. This makes it very convenient in case repairs have to be made on any of these parts. The telephones are so wired that there is no hidden wiring. This makes the "shooting" of trouble a very easy matter in case there should be any trouble to "shoot."

The Western company has just made a shipment of telephone apparatus to Champa, District Belaspur, Central Province, India, the simplicity of wiring and construction of the telephones, as well as the fine talking qualities, recommending them for the severe test they will be put to when installed.

SUMTER COMPANY AND ITS WORK.

An interesting article concerning the Sumter Telephone Manufacturing Company, of Sumter, S. C., is contained in the August number of the Business Magazine. The Sumter Chamber of Commerce furnished the material to exploit that city and its enterprises, and the high esteem in which the company is held in Sumter is evidenced by the warm praise given the concern in that publication. The article shows the wonderful development of the telephone manufacturing business in Sumter, presenting a bird's-eye view of the extensive manufacturing plant of the Sumter Telephone Manufacturing Company and cuts of the various switchboards, telephones and electrical apparatus manufactured by that concern.

The Business Magazine states that the Sumter Telephone Manufacturing Company has been the main source of supply for the Independent telephone exchanges throughout the south, and, by the superior grade of telephones and switchboards manufactured and sold throughout the south, has maintained the independence of the smaller telephone exchanges. The Sumter company, started about ten years ago by Charles T. Mason, a man of marked ingenuity and mechanical ability, had for its first factory a small frame dwelling, which was not as big as the present extensive and splendidly equipped offices of the company, but to-day several hundred thousand square feet of floor space are required to hold the plant, and over half of one city block is utilized for buildings, such as saw-mills, woodworking departments, machinery departments, polishing rooms, assembly rooms, nickelplating, boiler and engine rooms, box-making rooms, testing departments, planing rooms, shipping departments, and for sidetracks, lumber and for many other purposes incidental to such a large manufacturing establishment.

The fact that the instruments manufactured at Sumter have carried off gold medals from several expositions, such as the Charleston exposition and the Paris exposition, the St. Louis exposition, and that the local company maintains agencies in European countries, South America, Mexico, Canada and Cuba, where it ships hundreds of telephones and switchboards monthly, besides having agencies all over the United States, where thousands of instruments are sold annually, shows what can be done in South Carolina, in an agricultural section, remote from the large iron and steel sections of this country.

The United States government is a large patron of the Sumter Telephone Manufacturing Company and recently placed an order for nearly a thousand telephones with this concern in one order.

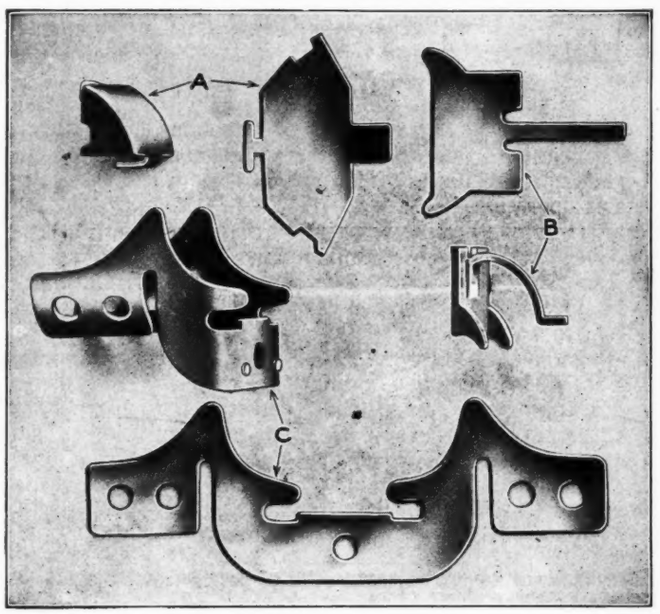
GOULD TANDEM COUPLE STORAGE BATTERIES

For small amounts of current, as required by police, fire alarm, railway signals, telegraph and private telephone exchanges and the like, the storage problem has been very cleverly met by the Gould Storage Battery Company, New York and Chicago, in its new "Gould tandem couple" type cell. In the new design, no separation of plates is needed. The plates are set end to end in each cell, one positive plate and one negative plate only, in each glass jar, obviating the usual tendency toward buckling and causing the wear and tear on one side only. The discharge takes place from both sides of the plate and from practically all parts of the plates at once, and this construction also eliminates the chance of grounding or short circuit between plates. Furthermore, the removal of any couple for inspection, cleaning or renewal, is not attended by the old time unbolting of connections, sawing of lead, accompanying lead-

burning outfit, etc., while greatly facilitating the replacing of any couple with the least possible interruption to the circuit. This method of grouping is also claimed to be a money-saver on first cost as well as on maintenance, because the doing away with separators cheapens and simplifies the construction of the battery.

STROMBERG-CARLSON SELF-RESTORING GRAVITY DROP.

The unique construction of the new self-restoring gravity drop manufactured by the Stromberg-Carlson Telephone Manufacturing Company of Rochester, N. Y., displays engineering ingenuity and mechanical skill of especial interest.



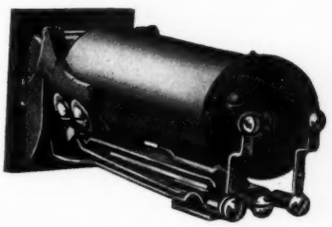
Self-Restoring Gravity Drop.

This invention is so constructed that all of its parts are secured in proper relation to each other, independently of the supporting or mounting plate. This feature has been accomplished by comparatively few parts of peculiar shapes formed of soft-drawing steel, with the exception of the indicator or shutter *A,* which is made of aluminum.

The shutter *B,* made of soft steel, carries an indicator *A,* which is formed, preferably, in the shape of a part of a cylinder with closed ends; that is, the surfaces exposed to view when the indicator is dropped, are a curved cylindrical surface and two plane surfaces, one at either end of the indicator. Aluminum was selected for the indicator because of its marked contrast with the surfaces (usually dull black) of the switchboard.

The support bracket *C* is the main punching which is properly formed to the armature, the shutter, the indicator and the thimble. This bracket is secured to the shell through insulations by two screws on either side. It will be noticed that the openings to admit the mounting screws are elongated to permit the adjustment of such bracket relatively to the shell by which means the armature may be caused to occupy the proper position relatively to the shell core of the coil.

The raised points shown on the front of the formed bracket fit into recesses in the face plate to prevent any chance of the drop twisting after being mounted on the plate.



Gravity Drop Coil.

In the illustration, showing five drops on a strip, it is quite noticeable how prominently an actuated drop may be distinguished. The indicators are plainly visible from different directions and so constructed as to display a plurality of differently exposed surfaces so that one or more surfaces shall always be prominently in view, regardless of the position of the operator. The night bell contacts are independently mounted on the upper surface of the mounting strip.

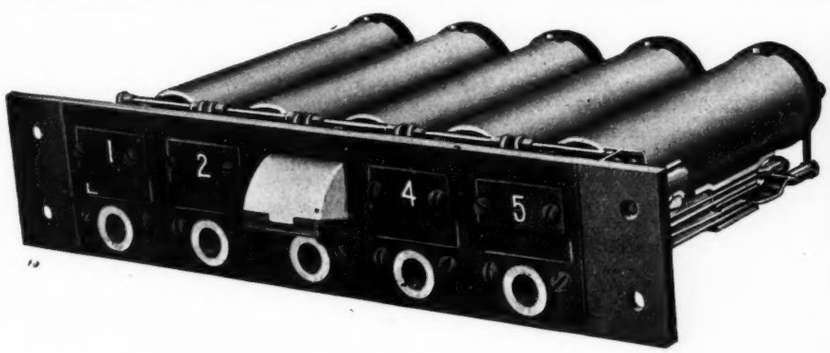
Gravity Drop Coil with Core Removed.

In other accompanying views the coil with the core intact is shown removed. This is very efficient construction, likewise the most simple to manufacture.

The Stromberg-Carlson Telephone Manufacturing Company is furnishing this form of drop with a new form of generator call switchboard cabinet.

INSTRUCTION CARDS; NAME PLATES.

Many telephone companies find themselves often in need of celluloid instruction cards or name plates for use on transmitter mouthpieces and coin boxes.



Five Gravity Drops Mounted.

THIS TELEPHONE CONNECTS YOU WITH ALL DEPARTMENTS OF THIS HOTEL AND THE GENERAL CITY EXCHANGE OF THE MUTUAL TELEPHONE CO.
CITY CALLS
CENTS
HOTEL CALLS FREE
OUR LONG DISTANCE LINES COVER THE STATE
GIVE YOUR CALLS TO THE CLERK

Celluloid Cards.

They will be glad to learn that there is an old established and reliable concern, centrally located, which makes a specialty of this kind of work, as well as all other kinds of special celluloid work, novelties, etc.

The firm referred to, G. Felsenthal & Company, 219 E. Van Buren street, Chicago, is well known to many readers of TELEPHONY. It has filled large orders for the Mutual Telephone Company, of Chicago, Ill., and many other companies, both Bell and Independent.

Illustrations herewith show a couple of the various styles made by this firm. Felsenthal & Company will be pleased to send samples and submit prices on work of this character.

BRISTOL COMPANY ESTABLISHES CHICAGO AGENCY.

One of the latest among eastern producers to establish a western branch is the Bristol Company of Waterbury, Conn., the well-known maker of Bristol recording instruments. This company recently opened a district office in Chicago at 753 Monadnock building, with H. P. Dennis as western manager. Mr. Dennis is a graduate mechanical engineer and was connected with the factory at Waterbury for several years. He also represented the Britstol Company at the St. Louis Exposition, and his appointment as manager of the company's western office is a well-deserved tribute to his ability and responsibility. Since his arrival in Chicago Mr. Dennis reports a thriving business as having been transacted by this newly established branch. The continuous information records furnished by the Bristol recording instruments, such as by its recording voltmeters and ammeters, is now employed to good advantage by telephone companies on batteries and switchboards. Another incentive to the establishment of the western office was the desire of the Bristol Company to furnish its patrons with the quickest possible service; Mr. Dennis makes a specialty of this.

NEW FACTORY FOR CANADA.

An event of great importance to the Independent telephone men of Canada is the announcement that the Dominion Telephone Manufacturing Company, Ltd., has been organized for the manufacture of telephones, switchboards and telephone supplies in that country. The headquarters of the new company will be at Toronto, with branches in the eastern and western sections of the Dominion, and all signs indicate that it will be launched with prospects of great success. E. B. Overshiner, president of the Swedish-American Telephone Company, Chicago, is the head of the new Canadian company. Mr. Overshiner is one of the best-known telephone manufacturers in the Independent field, and the success won by his Chicago company augurs well for the future of the Dominion concern.

The Dominion Telephone Manufacturing Company, Ltd., is capitalized for $250,000, of which $100,000 is preferred stock. At present all telephone apparatus used by Canadian Independents is purchased in the United States, and Mr. Overshiner and his associates believe the time is ripe to establish a factory in Canada to supply the growing Canadian trade. They assert that telephone manufacturers in the United States cannot successfully compete in the Canadian market with a modern Canadian factory, such as the Dominion company will have, because of an import duty amounting to 27½ per cent. Besides, they claim, the raw material will cost less in Canada, increasing the profits of the company doing business in the Dominion. It is Mr. Overshiner's purpose to establish an alliance between the Dominion company and the Swedish-American, enabling the Canadian concern to profit by the experience, credit and high standing of the Chicago company. Both Mr. Overshiner and his business associates are firmly convinced of the enduring success of the Independent telephone movement, and believe that both in the United States and in Canada it will continue to grow and develop, furnishing ample patronage for the manufacturers who cater entirely to Independent trade.

In the prospectus of the Dominion company the following are the advantages enumerated as showing why a Toronto establishment, starting as it does with a connection with the Swedish-American company, should meet with great success:

"1. It enters upon an unoccupied, ample and rapidly growing field.

"2. It encounters no Canadian competitor, and therefore crowds nobody.

"3. As a Canadian corporation and enterprise this company will find an open door for its output throughout the British empire.

"4. It is well protected against outside competitors by the Canadian tariff of 27½ per cent on imported telephones, and by freedom from the inevitable delay and inconvenience attending the passage of foreign goods through custom houses.

"5. It has an already created Canadian business, and a reputation for the highest class of telephone apparatus in the world turned over to it by the parent company, and can commence filling large and profitable orders the same day it starts operation.

"6. It enjoys a close community of interest with a leading American telephone manufacturing company having assets exceeding $400,000, whose founder and president, one of the foremost men in the entire telephone industry, becomes also the president of this company, and whose existing Canadian business is taken over by the Dominion Telephone Manufacturing Company, Limited. This alliance assures competent management, perfect product from the outset, exemption from experimental errors and losses, and secures the results of long experience by the parent company and the cumulative value of its many years of advertising and sales-effort in the Canadian field, and of its satisfactory service to Canadian customers."

THE ATLAS ANCHOR.

The attention of TELEPHONY's readers is invited to a recent invention, styled the Atlas anchor. By means of this invention, the cost of anchorage by "deadmen" is said to be cut in two. The manufacturers claim to be able to so set an anchor, in sandy soil, in from five to eight minutes, that it will resist a strain as great as the tensional strength of the guy rod. They are able to do this by the help of their "setter," another invention controlled by the same company.

The anchor is so constructed that it can be slid easily into a hole three-quarters of its own width, the edges cutting grooves in the sides of the hole, so that very little earth is disturbed. After the hole is filled up with tamped earth, the "setter" is applied, which puts a strain of several thousand pounds on the anchor and turns it to its permanent position. The strain that is exerted in doing this is so great that it is absolutely necessary to employ a thrust ball bearing in order that enough power can be obtained to revolve the anchor by only one man working. Our readers are requested to give this anchor a test. The Atlas Anchor Company of Cleveland, Ohio, its manufacturer, will guarantee it to be all it claims in every respect.

NEW ORDERS FOR V.-B. "BALLAST" BOARDS.

The Vote-Berger Company, La Crosse, Wis., manufacturer of telephones, switchboards and appliances, reports that it has recently closed a contract with the Wood County Telephone Company, Grand Rapids, Wis., for a complete common battery "ballast" multiple equipment for the exchange at Grand Rapids. The board is to have an ultimate capacity of 2,000 lines, with 500 lines installed, arranged for four-party selective ringing.

The same company reports the sale of a common battery "ballast" switchboard to the Viroqua Telephone Company

of Viroqua, Wis., with a capacity of 400 lines, non-multiple, with 300 lines installed, and a 300-line "ballast" board, with 200 lines installed, to the Union Telephone Company, Prairie du Chien, Wis. All three of these boards are to replace magneto equipment, which had proved inadequate for the service.

The feature of the "ballast" switchboard, which is said to have been mainly responsible for the securing of these orders, is the simplicity of its circuits, brought about by the elimination of all relays.

The maintenance expense of the "ballast" board is said to be below that of the relay type of common battery equipment. In the whole "ballast" system there are practically no moving parts to cause maintenance expense, except the cords, and the company claims a decided saving in the salaries of trouble men, etc.

NEW TERMINAL BOX FOR BUILDING WORK.

The American Electric Fuse Company, Muskegon and New York, has recently placed on the market a terminal box for building work. The box is of golden oak, finished in two coats of best varnish, equipped with heavy brass hinges and a bronze catch. It is made in three sizes, 10, 15 and 25 pairs, and is for use on floors of buildings where ten or more telephones are to be used, or for a branch exchange terminal or any other place where ten or more lines are to be connected through a single box inside of building where protection is not necessarily needed. The solder clips to which the cable are fastened are of German silver, set in hard rubber. The guide wire strips and lock nut terminal strips are of bone dry maple, boiled in linseed oil, and where the service wires run out the lock nut posts are provided with three extra heavy nuts. It is known as type "L," and as a box of this kind has never before been manufactured for the Independent field it should be a ready-selling specialty. Circulars, prices and full description will be gladly furnished either from the factory at Muskegon, Mich., or from the eastern branch at 116 Nassau street, New York.

THE CENTURY TELEPHONE CONSTRUCTION COMPANY.

The Century Telephone Construction Company of Buffalo, N. Y., since locating in its new plant, has found it advisable to open up a branch office and warehouse in the west, to overcome the delay in making direct shipments from Buffalo to its many western customers.

This branch office and warehouse is located at 408 Delaware street, Kansas City, Mo., where it occupies the entire building. With the amount of floor space, over 10,000 square feet, the company will be able to carry an enormous stock of all necessary construction materials, tools, supplies and apparatus.

The front part of the ground floor will be used as office and salesroom, the shipping department being located immediately behind it. The balance of the building is all given over to the stock which the company states will be the most complete in the west.

The manager of this branch is W. O. Rhode, who has had a wide experience in the west and is well known in many states. He is a practical telephone man with years of experience in the operating as well as the manufacturing field. Century customers will be well taken care of in the west with the opening of this branch as orders for all standard apparatus and material will be shipped on same day order is received.

HOW ONE INDEPENDENT COMPANY STARTED.

Nelson N. White, chief operator of the American Telephone and Telegraph Company's office at Maumee, Ohio, recently read a paper before a convention of chief operators at Toledo. To emphasize the fact that operators should be courteous always he told the following story:

"A man put in a toll call and was not satisfied with the Bell service and did not hesitate to tell the operator so. In reply, she said, 'Mr. Smith, if you're not satisfied, you can get a company of your own.' Mr. Smith happened to be the kind of man who could do that, and he did get a company of his own."

BELL FRANCHISE FORFEITED.

Mayor Sweeney of El Paso, Texas, has recommended that the city council forfeit the Bell telephone company franchise in that city. The council accepted the recommendation and gave the company thirty days to show cause why the order should not stand. The company was recently ordered to give a 50-cent discount for prompt payment of bills as provided in its charter, and it complied, but at once raised its rates. The mayor refused to permit this, and alleged that wires have not been put into conduits and alleys as agreed to and mentioned other violations.

A CORRECTION.

In the article entitled "Method of Preserving Wood" by G. H. Erich, which appeared in the August TELEPHONY an error was made in the analysis which should have read as follows:

Specific gravity at 20° C.	1.12
Flashing point	149°C.
Burning point	175°C.
Distillate up to 235° C.	.40%
Loss	.00%
Residue	89.60%
Distillate between 235° C. and 300° C.	10%

Tar acids from 1.3% to 2%.

CUYAHOGA INCREASES CAPITAL.

The stockholders of the Cuyahoga Telephone Company, Cleveland, O., have favorably voted to increase the capital stock of the company from $1,500,000 to $2,000,000. The stock will remain in the treasury of the company and will not be issued. It was simply authorized in order to bring the total of common and preferred stock up to $3,500,000 authorized. As this is the amount of the authorized bond issue, it will now be possible to issue bonds up to that amount when other restrictions of the mortgage regarding increases in main line telephones will permit. The total bonds now issued amount to $2,933,000, of which $233,000 are held in the treasury.

The recent death of Alfred G. Safford of St. Albans, Vt., attorney for the Interstate Commerce Commission at Washington, recalls the fact that Mr. Safford gave the first demonstration of the telephone made in Vermont. Alexander Graham Bell had just exhibited his invention and Mr. Safford was greatly interested, having served in the government telegraph corps in the civil war. Obtaining some instruments from Mr. Bell he strung a wire from his law office to the high school building on the opposite side of Taylor park and gave a public demonstration of the telephone with a lecture on the subject. It was two years later that telephones began to be installed in that vicinity as a commercial enterprise.

At Omaha, Neb., conduits have been laid by the Independent Telephone Company at the rate of five miles a week, and over sixty miles have been laid since April 22, when operations began, which breaks the record for telephone construction in the United States. Work in the business section of the city has been completed and service could be given if the central exchange was finished. The management of the company hopes to have nearly all lines in operation by the middle of next December.

TELEPHONE SERVICE ON RAILROAD LINES

An Interesting Paper Read Before the Association of Railway Telegraph Superintendents

By S. Lewis Van Akin, Jr.
(Assistant Superintendent of Telegraph, New York Central Lines)

A COMPARISON of the maintenance and operation of telephone service on railroad companies' lines with the maintenance and operation of telephone service on telephone companies' lines is necessary to a proper understanding of the subject under consideration.

The telephone company's maintenance force consists of plant superintendent, division plant superintendent, wire chiefs, battery men, switchboard maintenance men, local trouble men, instrument installers, linemen and an engineering department in an advisory capacity; while the railroad company's maintenance force consists of the superintendent of telegraph, with possibly an assistant, wire chiefs whom he has picked from the rank and file and educated for the work in connection with their other duties; telegraph companies' linemen, and, where a contract with the telegraph company does not provide that their men shall take care of inside work, the superintendent of telegraph may have authority for one man to each one hundred and fifty miles of line who can be called upon to work on telephone line test panels, and office equipment, under his personal supervision or that of his assistant, and in some cases the engineering department of the American Telephone and Telegraph Company in an advisory capacity.

A telephone company's operating force consists of a president, vice president, general superintendent, superintendent, manager, traffic manager, chief operators, supervisors, repeating clerks and line operators; while the railroad company's operating force consists of the superintendent of telegraph, wire chiefs and switchboard operators.

Telephone companies maintain their apparatus and lines by men assigned to particular branches, while a railroad company, having but one or possibly two long distance circuits, maintain the lines and office equipment, with men who have various duties to perform. The telephone companies have officers directly in charge of the maintenance and operation who are interested only in telephone work, to the end that the service is maintained satisfactorily not only to a few but to all concerned; while the railroad companies' switchboards are usually under the jurisdiction of local officials, who have other important branches of service to look after and do not realize the needs of the general telephone situation nor give proper attention to complaints of poor service; at the same time they themselves get the best of service due to the fact of their relation to it at that particular point.

Telephone companies' linemen report to their wire chiefs every hour, whether on trouble orders or inspection trips, and are not allowed to leave their statioins without orders or permission. They have territories ranging from six and not to exceed eighteen miles, being located as conveniently near the center of their respective sections as possible. Repairs are not made by them, but are reported to their foremen, as they are not expected to go farther than to keep the wires in actual operating condition, while the railroad company's lines are maintained by telegraph companies' men whose territory will vary from thirty to sixty miles. When at outlying points they have no means of communicating with their wire chiefs, and frequently from one to five hours will elapse after trouble is reported before they are notified of it. In the absence of wire trouble they are usually making repairs to the line, putting on guys, crossarms, guard wires, insulating, and in fact everything that can be done single handed.

The wire chiefs of the telephone companies are in touch with their linemen and issue orders direct to them, while the railroad company's wire chiefs (except when they are joint men), are obliged to report trouble to the telegraph companies and they in turn send men out to clear it. Telephone companies can economically maintain a large force of men to look after their larger plants, while railroad companies, with but one or possibly two circuits, could not consistently maintain a similar force, as the expense of doing so would be excessive and entirely out of the question.

Telephone companies' lines are invariably constructed along public highways or on private property where tree trimming privileges cannot be obtained, in consequence of which their standard minimum insulation is ten megohms per mile in clear weather. The insulation resistance of open line wires on railroad companies' lines will, in clear weather, show as high as sixty or seventy megohms per mile. The reason for this is that railroad companies' lines are on their right of way, where there is seldom any question regarding trimming rights and privileges. Thus, a high standard of insulation, which is essential to good transmission, can be maintained.

The practice of utilizing Wheatstone bridge measurements to locate trouble on telephone companies' lines is not employed effectually at long range on account of distributed leakage. Numerous testing points are, therefore, essential, being located on an average of every five miles, while on railroad companies' lines they are located on an average of every twenty miles, and the Wheatstone bridge measurements are here effectually employed at long range, and trouble is located very closely where a high standard of insulation is maintained, the results of such tests being seldom more than three or four ohms at variance. As parallel circuits are seldom available to patch out on railroad companies' lines it is needless to say that in case of interruption communication cannot be restored until the cause has been removed; while, on the other hand, telephone companies have various routes over which to switch their business in case one should fail; they also have parallel circuits with which to patch their most important circuits, and it is not as essential for them to hasten repairs as it is where similar conditions do not obtain.

To successfully operate a long distance telephone circuit on a railroad company line the most important requisite is a monitoring wire chief whose good judgment can be relied upon. It is also essential to have wire chiefs who are both telephone and practical railroad men, and a set of fixed rules that are comprehensive and definite.

The monitoring wire chief's duties can be summarized as follows: He should watch the lines closely for any irregularities in the service, such as line trouble, noisy connections or unlawful use of the lines. He should see that employes are attentive to duty, that the rules and instructions for the operation and maintenance of the service are complied with, that employes are courteous in the performance of their work, and that all calls are promptly and properly established and no partiality is shown in the matter of precedence to establish connections. He should assist in any lawful way to accelerate the service, establish morning test calls.

and, whenever necessary, to improve transmission, place telephone repeaters in the line and see that they are always in good condition. He should be responsible for the prompt clearing of the line of all switchboard connections on through calls, test the line to ascertain positively whether all switchboard connections, simplex coils, bells, etc., have been removed, and the line connected through at test boards and test panels before establishing the connection. He should keep a complete record of all interruptions and trouble on the line and inform the superintendent of telegraph promptly of each interruption or trouble, and advise him when communication is restored. He should check the standard of insulation and resistance of the entire line at least once each month, supervising the work of other wire chiefs who are expected to manage the offices at which they are located, while at the same time they have other duties equally distracting from this particular line of thought and work.

Wire chiefs should be located at division terminals, if possible, as is also the case with the monitoring wire chiefs. The latter, however, must be located at telephone repeater stations where repeaters are used, and these stations should be equipped with every convenience for the proper handling and supervision of the service.

The telephone set on a monitoring board should be equipped with a high impedance receiver so that the monitor can remain in on connections without noticeable loss in transmission; and, if a small switchboard is necessary at such a point for switching long distance connections, he should, to be in close touch with the operators and operation, handle it personally when on duty and closely watch the nature of the business transacted. Where a contract exists between the railroad company and a telephone company, stipulating that the use of their equipment and the establishment of connections from points on private lines through their switchboards is for the exclusive use of the railroad company and the transaction of its business, calls relating to private matters must not be allowed and should be immediately cut off and the parties involved notified that they cannot use the line for private business. This should be done, not only to carry out the spirit of the contract, which is sufficient cause for arbitrary action, but to insure the prompt transmission of railroad matters.

Unless this or some similar plan is adopted, calls covering private matters will creep in, operators will discriminate in favor of certain parties, allowing them to use the line in excess of the time limit, in consequence of which waiting calls will be unnecessarily delayed, and oftentimes the line will be held idle to establish a certain call; whereas, if it is known that a strict supervision is being maintained this will not occur.

When there is a congestion of calls between two stations operators will often insist on holding the line for more than a reasonable length of time, and calls waiting on other sections of the line would be delayed for hours, and if the monitoring wire chief is not authorized and empowered to settle disputes and questions between operators and those using the servce the situation will immediately become chaotic. One of the most important duties of a monitoring wire chief is to see that all stations have equal opportunity to establish calls. The operating rules of telephone companies are compiled with a view to furnishing the best possible service over their lines at fixed toll rates. In other words, they are in the business from a financial standpoint, and if the service so furnished is not satisfactory the only inconvenience they experience is that of financial loss. The rules to govern telephone service on railroad companies' lines are compiled to furnish the best service possible with limited facilities and to transact a maximum amount of company business. Company business, defined, relates to matters that strictly belong to the operation and maintenance of the railroad or are of interest to the railroad company; in other words, official business, which must be transacted without delay.

The demands of official business on one long distance circuit are so great that all unimportant matters, as well as private matters, must be eliminated, as otherwise the congestion of the service would be unbearable. If conductors, engineers, brakemen, firemen and all others not directly connected with the operating department were allowed to make use of the limited service, it would be next to impossible to transact important business, and, again, their communications usually consist of personal grievances which the division officials do not care to discuss by telephone, it being detrimental to good discipline, and they are adverse to allowing employes such privileges.

To meet the demands of the service as far as possible and transact a maximum amount of business it will be found necessary to limit calls during office hours to three minutes, excepting those made personally by certain company officials, whose communications should be unlimited. In order to protect unlimited service calls a list of those entitled to unlimited service and precedence should be compiled and embodied in the fixed rules.

On the New York Central Company's line between New York and Buffalo and the Lake Shore Company's line between Buffalo and Chicago precedence and unlimited service are accorded to the president, vice presidents, general managers, assistant general managers, general superintendents, superintendents of telegraph (who are responsible for the service), and chief engineers. These officials authorize the symbol "39" when they require immediate service, upon receipt of which telephone operators proceed to clear the advance line of all limited service calls and immediately establish the "39" connection.

When calls are made personally by the above named officials without authorizing "39" they are handled as "specials," that is, they are established next after the completion of any call or expiration of a time limit. Immediately after the expiration of unlimited service calls the connections that were cut off to establish them are re-established. On account of the lines referred to being used for both short and long haul connections, the direct New York-Chicago circuit is connected into nine private branch exchanges, and at each of these points the line is bridged with 2500 ohm bells; and, to operate Morse over the New York-Buffalo section the line is equipped with six No. 37-A repeating coils. The impedance offered by each of these coils is equal to about forty miles of No. 8 B. W. G. open copper line metallic circuit.

It was impossible to obtain good transmission on the line "bridged" with bells at seven intermediate stations, and with approximately the equivalent of two hundred and forty miles of additional circuit, due to the repeating coils, therefore, it was necessary to inaugurate a system to quickly clear the line of everything that would impede transmission, as follows:

The signal symbol "39" is authorized by operators and wire chiefs on all calls between points on the New York Central lines and points on the Lake Shore lines exclusive of Buffalo. The operator at the originating station immediately clears the advance line of limited service calls and passes the symbol, naming destination, to the advance station, and then notifies the home wire chief. Operators at intermediate advance stations immediately clear the advance line, relay the symbol and notify their wire chiefs of the "39" connection. The wire chiefs so notified immediately acknowledge the symbol call notice to the monitoring station and connect the line straight through at the line jacks. As soon as the monitoring wire chiefs are in communication on all New York-Chicago calls it requires about thirty seconds to test the line between Ravena, N. Y., and Elkhart, Ind., a distance of seven hundred miles, to see that it is absolutely clear of all office equipment. If they find that some one has failed to connect the lines straight through, which is very seldom the case, it may take an additional one minute to remove the remaining equipment. Assuming that

the line is found to be clear, they immediately notify the originating and terminating stations to proceed, and at the same time insert the telephone repeaters in the line. To follow these instructions to the letter, and establish a call between New York and Chicago, covers a period of about six minutes, and the quality of transmission is dependable.

Reviewing what has been said with regard to establishing through calls on our New York-Chicago circuit, it will be seen that all difficulties due to the "bridging bells" have been removed, that the line has been shortened, approximately, two hundred and forty miles by the removal of the simplex coils, and as the two sets of telephone repeaters are equivalent to three hundred and sixty miles gain in transmission the total of nine hundred and seventy railroad miles is reduced to six hundred and ten open line transmission miles.

After a through "39" call is completed the monitoring wire chiefs (who are monitoring the service at the repeaters) immediately notify all intermediate wire chiefs, by Morse, that the line is released from the through service. The intermediate wire chiefs watch a designated wire until the notice of release is received, whereupon they connect all equipment normal and notify their switchboard operators accordingly. The telephone circuit is invariably cleared and placed in local service in the insignificant period of thirty seconds. Referring to the local operation of the line that all stations may have equal opportunity to establish calls, a ruling is enforced that no two stations, under equal conditions, shall be allowed to hold the line to establish more than six calls or for a time period of thirty consecutive minutes. Unless the use of the line is so limited it would be impossible to transact business between all points without protracted delays at one point or another.

From the above comparison of the maintenance and operation of telephone service on telephone companies lines with an experienced adequate force in each of its branches, and the maintenance and operation of telephone service on railroad companies lines with a force who have combined duties to perform, it will be seen that the latter is a complex proposition. Telephone service on the New York Central lines was proposed in 1902, authorized in June, 1903, and the line construction completed December 3, 1904, but the quality of transmission obtained between New York and Chicago was very unsatisfactory up to August, 1906. Established precedent in the operation of the line was the principal cause for much of the confusion and difficult transmission experienced previous to this date. The radical departure outlined above has brought about the present satisfactory conditions.

Good results can be anticipated by operating similar lines in a like manner, as some of our people are of the opinion that the transmission and service over the railroad companies' private circuit, between New York and Chicago, is twenty-five per cent better than can be obtained between the same points on commercial lines.

INTERNATIONAL INDEPENDENT TELEPHONE ASSOCIATON

Official Bulletin No. 3 as Issued from General Headquarters, Cleveland, O., August 14, 1907

By Theodore Gary

THE present administration is pledged to a policy of strengthening the international organization in every way possible. It must depend upon, and asks this cooperation of the affiliated associations in carrying out this purpose. Officers of these associations are therefore urged to begin district meetings without delay, as suggested in Bulletin No. 2, and to take the necessary steps to eliminate any weak points in their organizations.

Associations which have not already divided their territory into districts should arrange to do so at once. Experience has demonstrated the advantage of the district plan over all others.

Whenever practicable, each association should engage some one to give its affairs exclusive attention in an official capacity. This method has been productive of splendid results wherever adopted.

WANTED—STATISTICS.

Each association should arrange to bring statistical information covering its territory right up to date and report same promptly to the general office at Cleveland. This is important. Those who have not been given blanks, reports, etc., to be used in gathering this data may secure them free upon request.

COMMITTEE ON LITIGATION AND LEGISLATION.

After careful consideration your president has appointed the following committee on litigation and legislation: Dwight E. Sapp, chairman, Mt. Vernon, Ohio; A. L. Tetu, Portland, Oregon; Frank H. Woods, Lincoln, Nebraska; J. B. Earle, Waco, Texas.

All of these gentlemen are peculiarly qualified for taking care of the work which will devolve on their committee. They are all actively identified with large operating interests and are well known to the Independent people everywhere as representative men. Your association is to be congratulated upon having secured their services.

REVISED CONSTITUTION.

The constitution, as revised at the last convention, is being printed for distribution. Copy free upon request. Address the Cleveland office.

FINANCIAL STATEMENT.

Apportionments by executive committee for 1907-8.

Associations.	
Arkansas	$ 100.00
California	300.00
Canada	25.00
Illinois	750.00
Indiana	1,000.00
Iowa	700.00
Kansas	400.00
Kentucky	200.00
Maine	25.00
Michigan	750.00
Missouri	500.00
Nebraska	350.00
New York	300.00
North Carolina	25.00
Ohio	1,300.00
Oregon	40.00
Pennsylvania	500.00
Texas	100.00
Vermont and New Hampshire	25.00
Virginia	50.00
West Virginia	250.00
Wisconsin	250.00
	$7,940.00

Contributions and pledges.

Switchboard and telephone manufacturers equipment stamps.

Magneto telephones and drops	$4,000.00	
Common battery telephones and drops	2,500.00	
	$6,500.00	
Supply dealers and jobbers	5,000.00	
Engineers	250.00	
Journals	500.00	
Operating companies	750.00	
		$13,000.00
General—		
Honorary membership fees	$750.00	
Miscellaneous accounts	791.14	
		1,541.14
Total		$22,481.14
Paid in		285.00
Balance to be collected		$22,196.14

Annual assessment one cent per unit. A unit is an operating telephone or a circuit mile of toll line. Assessments are payable monthly, and are based on number of units in respective associations at last convention.

Fiscal year, 1906-7, closed May 25:

Total receipts this year to date, including special committee balance	$11,840.06	
Total expenditures, including accounts accrued before last convention	10,838.05	
		$1,002.01
Accounts payable	$525.27	
Estimated expenses for next thirty days	325.00	
		850.27
Estimated surplus September 15		$151.74

(Publicity department not started.)

LONG DISTANCE MAPS.

We can furnish maps of fourteen states, showing the Independent toll line development. The map of Ohio is printed and will be sent postpaid upon receipt of twenty-five cents. Maps for the other states are in form of blue prints and will be made up to order at a nominal charge to cover cost and postage. We can furnish a blue print showing principal long distance connections from Atlantic coast west to central Nebraska.

For further particulars address Cleveland office.

SUPPLY DEPARTMENT—DISCONTINUANCE SALE.

The stock of "Shield" supplies is selling very rapidly. Get busy if you want to take advantage of the low prices prevailing. Price lists and full particulars free on request.

GENERAL INFORMATION WANTED.

If anything telephonically occurs within your range inform the home office. Such as good openings for extending the Independent field, legal decisions affecting the business in any way, or anything that seems to you would be interesting.

FUNDS.

Examine the financial statement, it speaks for itself.

WEEKLY FINANCIAL STATEMENT.

The following is the financial statement for the week ending August 24, 1907.

Cash on hand August 17, 1907		$774.34	
On deposit at Pittsburg	$676.74		
On deposit at Cleveland—petty cash account	97.60		
Total receipts for week		379.00	
			$1,153.34
Total disbursements		46.42	
Balance on hand—			
On deposit at Pittsburg	$1,055.54		
On deposit at Cleveland—petty cash account	51.38		
			$1,106.92
Accounts receivable		$1,153.03	
			$2,259.95
Accounts payable—			
Vouchered	$453.04		
Unvouchered	115.54		
		568.58	
Surplus			$1,691.37

BELL SERVICE IN SPOKANE.

The hustling citizens of Spokane, Wash., are having their own troubles with the telephone service furnished by the Bell company. A recent issue of the Spokane Spokesman-Review contained the accompanying series of illustrations showing the experience of a business man who is trying to reach a friend over the wire. The inference is drawn from the last picture that the aggravated subscriber is frantically rushing from the telephone to drown his sorrows.

WHEN A MAN GOES TO TELEPHONE IN SPOKANE

NUMBER?
GIVE ME 2245 IF YOU PLEASE. YES.
DID YOU SAY 4425
NO, LITTLE ONE I SAID 2245
WRONG NUMBER
HELLO IS THAT YOU BROWN?
WHY DIDN'T YOU SAY SO BEFORE
SAY, CENTRAL I WANT 2245 YES!
BUSY
GREAT SCOTT CENTRAL, WAKE UP!
CAN'T GET THEM
NAW, DIS IS HOGAN'S BAR, IF YOU WANT ANYTHING COME DOWN
HELLO! IS THAT YOU BROWN HELLO - O HELLO —
THOUGHT YOU SAID 5529
SAY GIMME 2245
NO - MR BROWN JUST LEFT FOR EUROPE
OH! H— D—
MORRIS

ITEMS FROM THE RURAL LINE DISTRICTS

Illustrated by O. H. Brandenburg

W. E. Smith of Colebrook was on our streets Monday looking after his telephone interests.—*Lancaster (N. H.) Democrat.*

The farmers' telephone company is busy building a new line past the midway creamery going west.—*Owatonna (Minn.) Press.*

C. M. Hartley, manager of the local telephone company, has completed a line to Punk.—*Wilcox Correspondence Omaha (Neb.) Bee.*

The telephone is being staked out preparatory to setting the poles.—*Southwest Baltimore Correspondence, Hastings (Mich.) Banner.*

The Plymouth & Campton Telephone Company is extending its line to Willard Pulsifer's in Campton Bog.—*Plymouth (N. H.) Record.*

John Varbough, a well known telephone man at Washington, has gone to Kentucky to attend a fox chase.—*Evansville (Ind.) Courier.*

The new switchboard for the telephone exchange has arrived and will be put into commission at a right early date.—*Clayton (Ill.) Enterprise.*

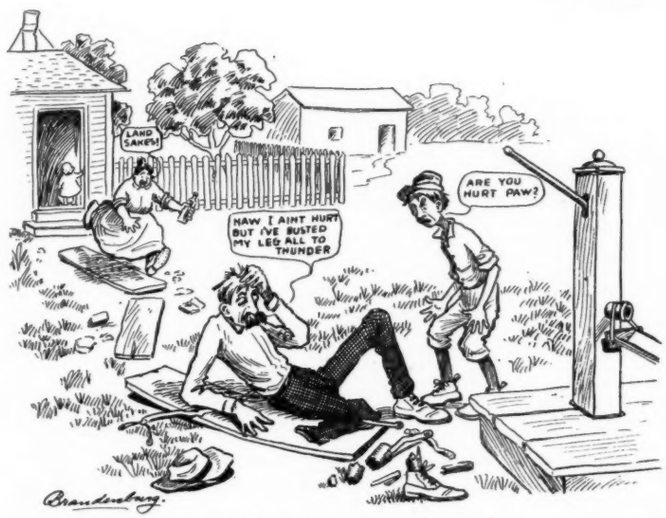
Mr. Kingery and Homer Talkington were here Friday to see about a southern connection of the Farmers' Telephone line.—*Cottonwood Falls (Kan.) Leader.*

The agent for the new telephone line is in town, and is directing the work of setting posts, etc.—*Southwest Harbor Correspondence Ellsworth (Me.) American.*

More telephone lines are being put up in this upper end of the county. The wires are already so thick the birds can hardly fly through the air without coming in contact with them and cutting their heads off.—*Jollytown Correspondence Waynesburg (Pa.) Independent.*

YOUNG MEN, I'E A MIND TO PUNISH YOU TO THE FULL EXTENT OF THE LAW
YOUR HONOR I THINK THE BOYS ARE WILLING TO PAY THE DAMAGES
JUSTICE OF THE PEACE
Brandenburg.

The Nunda Telephone Company has been having no end of trouble of late by having glass insulators shot off from poles and wires broken down on the line. Again this week the same trouble was experienced and farmers along the line who have been watching to catch the ones committing the offense discovered two "smart alecks" of Castile with guns and enjoying themselves by shooting off the insulators and in one place shooting the wire in two. One of the men was about 28 years old and the other about 20. The farmers notified Supt. Osgoodby at once and he started out to catch them. They had broken the line near Jacob DeMocker's on the hill and again near John Long's at Oakland. They were found to be prominent citizens of that village. They secured the services of Attorney Windsor of Castile to defend them and when they learned that the penalty for such an offense is two years in state's prison, although not admitting their guilt, were glad to pay the $10 damages done to the line if Supt. Osgoodby would drop the case, which was done.—*Warsaw (N. Y.) Times.*



Fred Brainerd is unable to attend to his work as teamster for the Citizens' Telephone Company, for the present at least. While walking from his residence to the barn at the rear of his lot Thursday Mr. Brainerd slipped and broke his leg. No physician was summoned, as the leg was splintered and broken in many pieces and the services of a physician would be useless. Mr. Brainerd simply returned to the house and is now meandering about on a pair of crutches awaiting the arrival of another artificial limb from Chicago—*Cadillac (Mich.) News and Express.*

The telephone company will give its third annual picnic Wednesday at the Salemsburg park. Several bands will furnish music both in the evening and in the afternoon. The Harmony orchestra from Happy Corner will also appear on the program.—*Salemsburg Dispatch in Topeka (Kan.) Capital.*

The telephone company are to give a lecture at Atkinson Corner hall Tuesday evening. Telephone instruments will be placed there for the evening and all can have the privilege of sending messages to any part of New England. A pie social will also be given for the benefit of the grange.—*Atkinson Correspondence Lewiston (Me.) Journal.*

The Farmers' Mutual Telephone Company have employed Mrs. Denhart to run the central office, and she will move into the building the first of next week. Her daughter Katie will have charge of the station or, in fact, she now has charge, and is getting along all right and seems to be quite well adapted to the work, and we ought to have good telephone service from now on.—*Ramsom (Ill.) Review.*

Two barbers won two telephone girls in this place, both marriages taking place Sunday. The contracting parties are C. W. Sherwood, proprietor of the leading barber shop in the city, and Miss Jessie Ryckman, telephone girl in the office of the Swaverly Telephone Company, and James Borst, a barber of this place, and Miss Mamie McNeil, also of the Swaverly Telephone Company.—*Kalkaska Correspondence Jackson (Mich.) Patriot.*

General Manager and Lineman Frank B. Rowe of the Great Western Telephone Company called this office over the wire Saturday night to give us the information that he had just arrived at Midland with his west bound line. This gives our enterprising neighbor burg quick communication with the outside world. They say all things come to he who waits and Midland has been waiting a long time, but things are coming fast now.—*Ft. Pierre (S. D.) Fairplay.*

District Manager A. A. Shephard of the Michigan State Telephone Company, this city, and A. J. Palica of Racine, Wis., a member of the White-Long Electric Theatre Company, returned yesterday from a fishing expedition up on the Brule river. According to Mr. Palica, the genial manager of the telephone company forced the waters of the roaring Brule to surrender a beautiful speckled trout, weighing four pounds, dressed.—*Iron Mountain (Mich.) Gazette.*